

The Iron Age

A Review of the Hardware and Metal Trades.

Published every Thursday Morning by DAVID WILLIAMS, No. 10 Warren Street, New York.

Vol. XV: No. 9.

New York, Thursday, March 4, 1875.

\$4.50 a Year, Including Postage.
Single Copies, Ten Cents.

The Proposed Tunnel Under the English Channel.

The French Assembly having voted affirmatively upon the opening of this stupendous enterprise, the London papers received by the latest mail contain diagrams, charts, and particulars relative to the proposed tunnel, which may prove interesting to our readers. The submarine railway will have a length of twenty-two miles between the English and French shores. It will have to be cut through a bed of chalk, which is upward of 500 feet deep on each shore from high-water mark, and the investigations lead to the conclusion that it is continuous, and that it stretches without interruption beneath the sea across the straits.

On the line of the tunnel the depth of water at high tide nowhere exceeds 180 feet, so that, were Westminster Abbey to be sunk in the deepest part, its towers would project 45 feet above the surface of the water. As at present planned, there will nowhere be less than 200 feet of strata above the tunnel, and this will allow the railway approaches to be formed with a gradient of about 1 foot in 80. From the bottom of the descent on either side the tunnel will, for the purposes of drainage, slope upward toward the center at an inclination of 1 foot in 3640.

The boring in St. Margaret's Bay was commenced at the beginning of 1866, and was completed in 1868. It was carried through the chalk and into the green sand, which was reached at a depth of 540 feet below high water. The boring on the French coast was commenced in March, 1866, and was continued to a point in the lower or gray chalk, about 520 feet below high water. At the same time that portion of the bottom of the channel lying between the chalk cliffs on each shore was carefully examined. The principal, practical and useful results that the borings have determined are, that on the proposed line of the tunnel the depth of the chalk on the English coast is 470 feet below high water, consisting of 175 feet of upper or white chalk, and 305 feet of lower or gray chalk; and that on the French coast the depth of the chalk is 750 feet below high water, consisting of 270 feet of upper or white chalk, and 480 feet of lower or gray chalk. It also appears probable that there is no great fault or serious interruption in the continuity or regularity of the strata between the two shores on the proposed line of tunnel. On the completion of the tunnel, a double line of rails will be laid down in it, and trains will run from Dover to Calais without any intermediate stoppages. It will be possible, then, to go from London to Constantinople without changing cars, and very soon, too, as far as Calcutta. About 300,000 passengers cross every year the channel between Dover and Calais. It is calculated that, when the horrors of that sickly and too celebrated sea passage shall give place to an easy traveling in railroad, 1,000,000 persons will cross between England and France, which will bring large dividends to the Tunnel Company.

The boring machine to be used in excavating the tunnel is shown in the accompanying illustration. It will be driven by steam or compressed air, as may be found most advantageous and economical. We shall give our readers a fuller description of the manner of its operation in a future issue.

Phosphorus Steel Making.

M. F. Gautier, engineer of mines, France, gives the following useful sketch of the various methods for producing phosphorus steel, or, to use a more correct definition, phosphorus cast metal. This metal, says M. Gautier, cannot be employed in industry except on condition that it is nearly deprived of carbon, consequently every process which will yield extra soft steel will, with inferior materials, produce phosphorus cast metal.

I. THE BESSEMER PROCESS.—1. The *Ferro-manganese Process* practiced at *Terre Noire*.—The silicious pig iron used contains but little manganese; the first stage, that which precedes the appearance of the yellow ray in the spectroscopic, lasts about a quarter of an hour, according to the richness of the pig iron in silicon. There is no explosion, the flame is pure, without smoke; the completion of the operation is positively marked by the disappearance of all the rays of the spectroscopic with the single exception of the yellow sodium ray. For the production of extra soft metal the refining is prolonged for about twenty seconds, the blast is stopped, and the converter is laid on its side. Manganese iron, previously heated to redness, is then thrown in by means of shovels, taking care that the pieces pass through the scoria and enter the metal. The manganese iron used is an alloy containing a little carbon; the manganese in it reduces the oxide of iron in the converter and the greater part of the carbon is converted into oxide of carbon in the form of brilliant flames. When the agitation ceases the charge is drawn. The metal is even and quiet, without bubbles or other irregularities; and, which is of essential importance, the product is

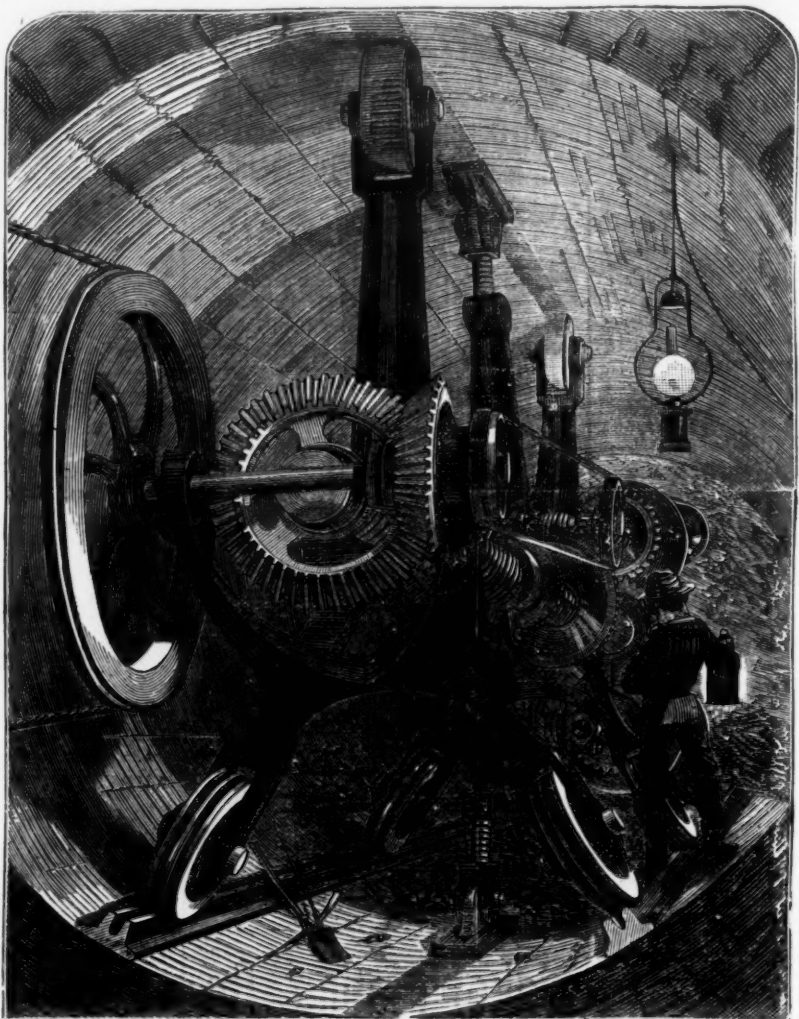
always equal and regular in practice. This is the method also which is adopted at the *Seraing* works, with the same manganese iron.

2. *Swedish Method, with highly Manganiferous Pig Iron*.—The pig iron used is without silicon, but rich in manganese; the proportion running from 4 to 5 per cent. The character of the operation is such that there is not what is called a first period; the yellow ray appears at once. There are abundant explosive projections, which would render the process ruinous if care were not taken to have enormous converters relative to the quantity of metal treated. The flame is veiled by smoke and gases, the principal of which is oxide of manganese. It is difficult to control the operation, for if the temperature be reduced by additions of small quantities of steel and iron, the object is not attained, for the heat must be retained in order to keep the metal in such extreme fluidity as will permit the oxide of iron to separate itself and arrive at the surface, for no addition is made of spiegel. The work is carried on blindfolded, for the intermittent flashes of flame are blinding, the heat caused by the explosions is annoying, and the spectroscopic is misleading. From time to time samples of the scoria have to be drawn to find how matters are proceeding; after a certain amount of experience, the state of the metal is ascertained by the behavior of metallic globules under the hammer, and from the color of the scoria. But the results are uncertain, and have to be classified. The ingots, moreover, are liable to shrink and to become flawed. This mode is adopted at *Fagersta*, in Sweden; at *Zwickau*, in Saxony, and *Maxhutte*, in Bavaria; but it requires all the value that attaches to the production of extra soft steel to induce any one to continue a method so uncertain.

3. *English Method, that of Spiegelisen by Explosion*.—In this process, silicious pig, such as that of Cumberland, for example, is employed, and the operation is carried considerably beyond complete decarburization. In order to succeed, a certain quantity of oxide of iron, neither more nor less, must be produced in the bath, and which carries off by explosion the carbon of the spiegelisen which is added. This instantaneous production of oxide of carbon is dangerous, a part of the metal, and sometimes the whole charge, being projected out of the converter and endangering the operator and his men. Generally, the product is soft, but it is liable to flaws, which are not much felt in sheet iron, but which unfit it for rails. Steel makers will choose which ever of these three methods appears to them the more advantageous for the production of phosphorus steel with pig iron of second quality. M. Gautier adds: The Bessemer process is destined to lose much of its importance in presence of the certain and unlimited extension of the Martin-Siemens process, which he considers will take the lead in future, and regulate prices. It is capable of using up old iron, and employing almost all kinds of ore, for puddling is still the only known method of practically getting rid of the greater part of the sulphur and phosphorus, while the Bessemer process, requiring silicious pig iron containing little sulphur, must always be of a limited application. The true mode of making phosphorus steel is then in the sole furnace.

II. THE MARTIN-SIEMENS PROCESS.—In this method the matter is more simple. In order to produce extra soft metal there is but one way, that is to say, to act chemically upon the oxide of iron in the bath. Manganese iron must be resorted to, as spiegel always gives hard products; the proportion is the same as in the Bessemer process, namely, 1 per cent. of the whole, or about 2 per cent. of manganese iron to 40 or 50 per cent. of useful metal. When a sample is procured which bends perfectly when cold, the manganese alloy heated to redness is added, the bath is stirred slightly and the charge run off.

An account, by M. Gréner, of the process followed at *Zwickau* and *Maxhutte*, supplies a striking confirmation of the fundamental properties of phosphorus steel; you may introduce phosphorus into cast steel on condition of eliminating the carbon, and the less the amount of the latter the greater may be that of the former. Practically by the German method, which is really but that of *Fagersta* applied to less pure materials, metal is produced which may almost be said to be without carbon, and, as no spiegel is introduced, there is no element of recarbonation. It is not, then, astonishing that the metal thus obtained should be perfectly malleable and yet contain a notable proportion of phosphorus, that is to say in proportion to the formerly admitted amount of 1 millieme 8, which is only half the quantity which may be tolerated in a truly soft steel, when produced in a Martin-Siemens furnace with manganese iron.



BORING MACHINE FOR THE CHANNEL TUNNEL.

Machinery.

The manufacture of machinery, and particularly that intended for other fabrications, though confined chiefly to Pennsylvania, New York, Massachusetts and Ohio, has attained such an amount, and been attended by so many improvements and so many important discoveries, and is still gaining so much in every way, and promises such serious results, that it is entitled to more consideration than it has received.

In his valuable report to Parliament last year, Mr. Harris-Gastrell stated that all of the establishments in this country engaged in making machinery expended \$21,405,673 for materials in 1869, and \$60,423,642 in 1870; and produced 36,194 boilers, 7677 stationary engines, 1137 locomotives, 3150 pegging machines, 6549 cider mills, 6060 cotton gins and presses, 1211 grist mills, 6981 lathes, 6552 steam pumps, 2456 saw mills, etc., bringing the value of all their products from \$51,837,366 to \$138,519,346 in a single decade. The proportion of Pennsylvania was \$29,258,153; of New York, \$30,962,058; of Ohio, \$11,834,489. The later increase has probably been in a fair proportion to this. At all events, the Baldwin Locomotive Works, of Philadelphia, exported 44 engines, valued at \$563,066.94, in 1873, and raised the number to 99, valued at \$1,432,800.27, last year. We have remarked the export of gas fixtures to St. Petersburg; of carriages to India; of sewing machines over the world; of sugar machinery to Brazil, and of other articles of the same nature to Australia, Peru, Turkey, Japan, Great Britain and elsewhere. The recent exposition of the Franklin Institute, in Philadelphia, corroborating the awards made at Vienna to Messrs. Sellers, Corliss, and other makers, has proved that the scientific test of excellence agrees with the practical, and the increasing production is war-

ranted by the strongest and most enduring principles.

This point has been attained from a very small beginning, and despite great difficulties, owing to abundant and superior material, and particularly to the skill of those employed, who brought unwonted native abilities where they were appreciated. The attainment in all of its stages has ministered more gain than it has received. It has enabled hundreds to do the work of thousands, and to do it better than it could be done otherwise. It has attracted population, employed and rewarded capital as well as labor, and created markets as well as supplied them. There is no department of business so simple or so complicated that has not shared something from this source, and the political strength of the nation has drawn largely from it.

This advance, so creditable, valuable and remunerative, that blends intellectual with physical vigor, and touches every point of use—great as it has been—has not been exclusively ours. The competition of the world is now for mechanical superiority, and the tendency to this end has stimulated the ability of other countries as well as of our own.

Whatever land can manufacture the best of any kind, at the lowest price, commands so much and more of the world's wealth and of influence in its affairs. The fact bars indolence and forces new competition. In this we have the encouragement drawn from signal past achievements, extending into the present; the same native ability, trained by scientific and technical tuition; the possession of such amounts of coal, of iron, and other metals and minerals and wood, and textiles of every kind as no other country enjoys, and abundant food at low prices. We have opened some foreign ports to the products of our mechanical skill shown in its manufactures—some to the machinery itself. The export of the latter does not include the ability to use it most efficiently—certainly not to improve it, and this constant superiority, sprung from domestic ability, must be relied upon to retain the best offices of success.

We are now at a stage when every domestic and foreign reason conspires to command more respect for mechanical ability. A world of material and every opportunity and the utmost need are useless without the skill and energy for their employment. The great Exposition next year will show what we have done on a grand scale, and will disclose what has been done elsewhere. Studying this, a chart can be drawn for future effort, and in the display statesmanship will be able to apprehend national possibilities, near and vast, that must be considered. For from this time mechanical superiority must be sought until it is securely held. With our possessions every other advantage follows this.—*Phila. North American*.

Hydrogenized Iron.

Some time ago, M. Cailletet described to the French Academy experiments on the passage of hydrogen through iron at ordinary temperature. He found that when a plate of iron is attacked by dilute sulphuric acid, the hydrogen is in part absorbed by the metal, and that, if a system be employed, consisting of two iron plates, soldered edge to edge, the tension of hydrogen which accumulates in this apparatus will equilibrate a column of mercury 0.35 m. in height. The author has been prosecuting his researches further as to the association of iron and hydrogen. The following is a short account of his observations:

On decomposing, by means of a battery, a neutral solution of chloride of iron, with addition of salammoniac, one obtains, at the negative pole, metallic iron, in the form of bright, fragile, nipple-like prominences that are hard enough to scratch glass. This iron, after being washed, liberates, under water or

any other liquid, numerous bubbles of gas, which is found to be pure hydrogen.

In free air the galvanic iron loses only a part of the hydrogen it contains. A specimen, weighing 0.90 gr., kept fifteen days in an open tube, gave, when heated, 18 cubic centimeters of gas, or more than half the quantity which it contained at the moment of its preparation. If you put a fragment of hydrogenized iron into a glass filled with water heated to 60° or 70°, the liberation of gas becomes tumultuous, and there is often intense crackling.

M. Cailletet examined a great number of specimens of iron, obtained in solutions more or less dilute, and reduced by currents of different intensity, as to the total quantity of gas they contained. For this purpose the metal was heated in the vacuum of a mercury pump, and the gas given off was measured. The agreement in the numbers was very great. Thus, he found for one volume of iron—I., 248; II., 235.50; III., 236.90; IV., 244.85 volumes of hydrogen. If you bring a piece of hydrogenized iron near a body in ignition, the liberated hydrogen burns, and the metal is sheathed in a light flame, similar to that of a wick dipped in alcohol.

When the iron has lost by heat the hydrogen it contained, the gas cannot be restored to it. Using as negative electrode, in a voltameter, a plate of galvanic iron previously heated, the author found hydrogen of the decomposed water liberated abundantly on the metal; but the plate did not take up hydrogen, even though the battery was in action several hours. (Thus iron is not comparable to palladium, which occludes, as Graham has proved, a quantity of hydrogen, that may be removed and restored a great number of times). Galvanic iron can be easily pulverized; but, after heating, it resumes a certain ductility.

Hydrogen, uniting with iron, communicates to it a considerable coercive force. A wire of platinum, coated with galvanic iron, was placed in the axis of a magnetic needle, oscillating on a pivot, and at a fixed distance from one of its extremities. The needle, drawn from its position of equilibrium, oscillated twenty-six times in a minute. The iron having been magnetized and replaced at the same distance from the needle, the latter made forty-two oscillations in the same time. Heated to a red heat, the iron lost its poles. When magnetized anew to saturation, it made the needle oscillate only thirty-three times in a minute. If we suppose that the magnetic forces of the iron in these three states were to each other as the squares of the number of oscillations, and take as unit the magnetic force of hydrogenized iron not magnetized, we have, for the magnetized hydrogenized iron, 2.600, and for the iron deprived of hydrogen and magnetized, 1.610. Thus the presence of hydrogen in iron, modifies greatly the magnetic properties of that metal. Owing to the numerous gas bubbles given off by hydrogenized iron the author did not succeed in obtaining its density. After expulsion of hydrogen the density of iron is 7.302 (mean of three observations).

The various specimens of iron M. Cailletet examined contained, for one gramme of iron, 32.80 cubic centimeters of hydrogen, or, for one equivalent of iron, 0.950 gr., which corresponds to the formula Fe^2H , if the association of the two bodies be considered as a definite compound; but the author thinks rather that the hydrogen, in uniting with the iron, plays a part analogous to that of carbon in steels, communicating to it, as has been seen, a great hardness and considerable coercive force.

These results are important in connection with the facts brought to light by Graham, of occlusion of hydrogen by palladium, the researches of MM. Sainte Claire Deville and Troost on passage of hydrogen through homogeneous solid bodies, and those of MM. Troost and Hautefeuille on combinations of hydrogen with the alkaline metals.

How to Use a Grindstone.—Common grindstone spindles, with a crank at one end, are open to the great objection that the stone will never keep round, because every person is inclined, more or less, to follow the motion of his foot with his hand, which causes the pressure on the same to be unequal. The harder pressure is always applied to the very same part of the stone, and will soon make it uneven, so that it is impossible to grind a tool true. To avoid this, put in place of the crank a small cog-wheel of 13 cogs, to work into the former. The stone will make about 97 of a revolution more than the crank, and the harder pressure of the tool on the stone will change to another place at every turn, and the stone will keep perfectly round if it is a good one. This is a very simple contrivance, but it will be new to many of our readers.

Purifiers of Cast Iron.—M. Garnier recommends the use of chlorides of silicon, with or without chlorine, for the purification of the melted iron in Bessemer converters, or furnaces with fixed or revolving soles. The chlorides are obtained from natural hydrated silicates, or from forge scoria.

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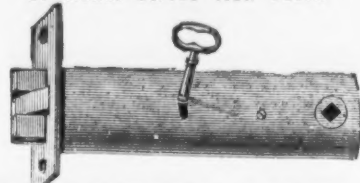
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New Patents.

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IMPROVEMENT IN THE MANUFACTURE OF IRON
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 The cause of this astounding result is that the
OLIVER'S CHILLED PLOWS prove on
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4th. They will scour in all kinds of soil.

5th. They are the cheapest plow used.

6th. They are the only chilled plows made.

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 board forming one continuous curve, thus compell-
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 the share is easy and natural and abrupt angles do
 not exist, while our chilled iron possesses a peculiar
 smoothness and solidity throughout, far ahead of
 any other metal used in plows.

Our second point needs no explanation from us,
 as chilled iron is conceded by all to be the hardest
 and most durable metal used for this purpose.

Its temper is uniformly hard, and will not scratch
 nor corrode.

Our third point is secured by a movable beam,
 placed over the center of the work, which can be so
 nicely adjusted by moving to the right or left, that
 the plow will run without handling. With these
 plows the most uninteresting portion of farm labor
 becomes a pleasure and a pride.

Our fourth point is secured by the combination of
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 moldboard and share. Every part of the metal below
 the ground is subject to equal wear, leaving no por-
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 the plow. The change from gravelly to prairie soil
 can be made with a easy, as the metal is so hard that
 it cannot be scratched, and its peculiar smooth-
 ness is not disturbed by any roughness.

Our fifth claim is, that the draft of the draft
 of **OLIVER'S CHILLED PLOWS** will
 average fully twenty-five percent less than that of all
 others, which we can prove by our own days' work
 with other plows, and our own eyes can be
 saved, by using

OLIVER'S CHILLED PLOWS,

with the same amount of power expended.

The great durability of these plows, consequent upon
 the extreme uniformity and hardness of the chilled
 metal, is another item to be considered in this con-
 nection.

Our chilled moldboards, after plowing one hun-
 dred acres, show a loss of weight of from four to
 seven ounces, depending on the soil in which they
 are used.

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 used in plows.

Our sixth claim we will not discuss here, but
 should it be disputed by any one, we shall be happy
 to convince the most skeptical of its truthfulness.
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 devote their entire capital, time and facilities to the
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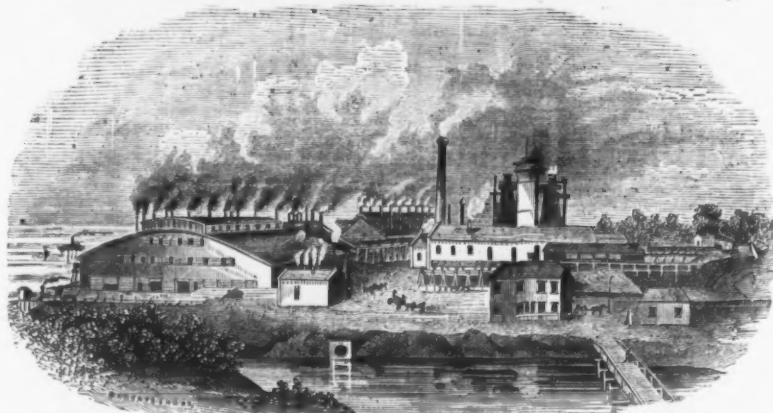
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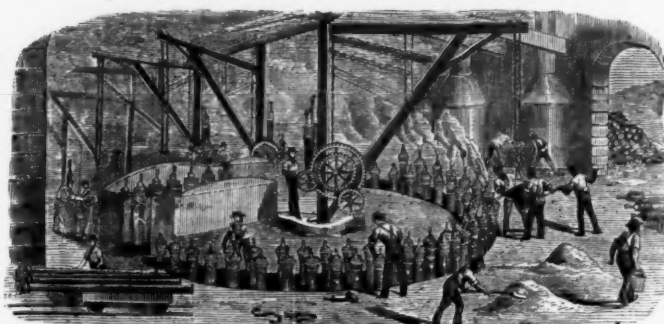
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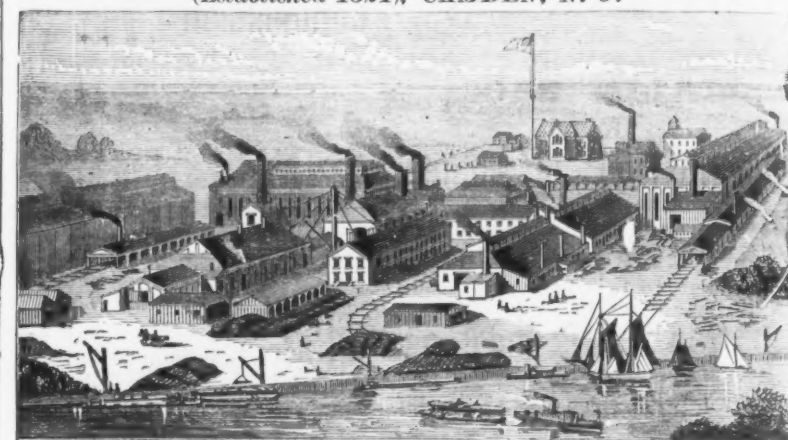
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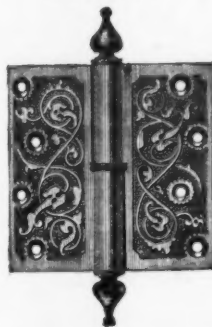
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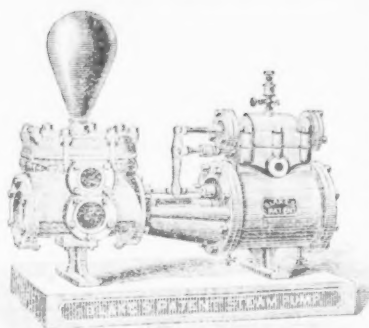
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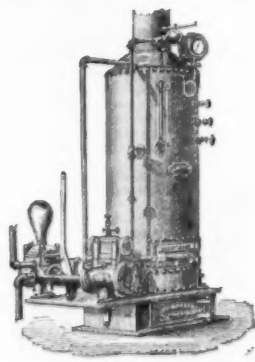
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Geo. F. Blake Mfg. Co.,**79 & 81 Liberty St.,
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A Needle Factory at Redditch, England.

The manufacture of needles, first carried on in Spain, and thence spreading to Germany, may be said to have taken root in England in the sixteenth century, and now constitutes a by no means unimportant British industry. Its sole seat is Redditch, a small Worcestershire town, about 14 miles from Birmingham, whose population of 7000 is almost exclusively employed in the numerous divisions of labor connected with its staple manufacture. Redditch has acquired a world wide reputation for the excellence of its productions, the fabrication of which, it may be said, involves a great number of distinct and intricate processes. For this reason we shall not, in dealing with the needle manufacture, attempt to describe it with technical accuracy at length, but shall simply give a sketch of these small but highly important domestic implements from the rough wire up to the finished glittering product. The processes of manufacture were seen in the factory of Messrs. W. Bartlett & Sons—one of the best and oldest needle-making houses.

The steel wire used in the manufacture is received in large coils, and is of different gauges to correspond with the various sized needles it is desired to produce. It can be very well understood what great care should be bestowed on the selection of the steel used in the manufacture of these articles, as the price of steel varies from £15 to £130 per ton. It is cut by shears into proper lengths, regulated by a "cutting measure," and the wire so cut is then made into bundles, each of which is confined by two iron rings. These bundles are transferred to a furnace, and afterward rubbed on an iron plate with an instrument, the object being to straighten the wires, each of which, it should be said, is of the exact length for two needles. Pointing is the next operation, and is performed by an ingenious machine, which has superseded the old, and—to the workman—injurious manual process. The wires are fed into the apparatus through a kind of hopper, and in the inner mechanism are operated on by rapidly revolving grindstones, which do the pointing business with great speed and precision. A double-pointed wire covered with a film of black oxide is now before us, and to remove this in the middle of the wire—where the eyes are to fall—is the function of what is called the "skimming" machine. In passing through it the central portion of each wire is brought into contact with a revolving strap carrying emery powder, which removes the objectionable film, and renders the wire fit to pass on to the stamping press. Here stands a man, who takes a wire, adjusts the center with nicety under the steel die worked by his foot, and stamps an impression, but without perforating the wire. The dies of course correspond with the size and make of needle in course of manufacture. The eyes of the needles are but partially formed, and we follow them to the eyeing press. The exact spot where the eyes of our double needle are to fall is indicated by the impression, and, guided by this, the girl who works the press punches them out. This process is, as may be imagined, one of extreme exactitude, but so dexterous does practice make the girls that they seldom "make a mistake," and are able to perforate some 25,000 wires a day. A burr or projecting edge is formed by the stamping of the eyes, and to facilitate its removal the bored lengths are "spitted" or strung on two wires, and the projections, thus being brought in a line, are carefully filed down. Next the row of wires is broken between the eyes, and for the first time each needle assumes a separate existence, though still in the rough. The head has to be made smooth and even by another filing, which is done with the needles in rows, the points being protected meanwhile. The needles being in a soft state so far as we have traced them, it is now necessary that they should undergo a hardening process. So the furnace is again brought into requisition, and the needles, having been heated to the proper pitch, are cast into tanks containing oil or water, as the case may be. The play of flame on the surface of the liquid caused by immersion of the heated steel is a rather pretty sight. The condition of the needles after undergoing this process is one of extreme brittleness—they are, in fact, quite rotten. Tempering is therefore the next operation called for, and is effected by placing the needles on a steel plate heated by a furnace, and moving them about thereon. The workman who has charge of the matter keeps a sharp look out for the appearance of that gradation of color which indicates that the process has arrived at completion. Care at this stage is most essential, a needle of bad temper generally originating a like undesirable, though perhaps transient, state of things in the user. After this process, which causes many of the needles to become crooked, they are examined while each one is rolled with the finger over a smooth steel anvil. Those that are not straight are detected by this means, and each one is tapped with a small steel hammer until perfectly straight. This work is generally done by women at their own cottages. The needles are now packed in parcels containing from 20,000 to 90,000, and are ready for "scouring." Upon their arrival at the scouring mill the needles are covered with a film of oxide, which has to be removed. This is effected by placing a quantity of needles in a rough kind of cloth with emery and other detergent matters, the cloth being then tightly tied up, and the package taken to a machine somewhat in the form of a mangle. Here heavy circular wooden blocks, or "runners," actuated by powerful gearing, traverse to and fro on a table upon which are placed the packets of needles. Each individual one is, by the great pressure thus brought to bear, made to revolve. After a sufficient time has elapsed the needles are removed, washed, and again transferred to the scouring machine. Not

until this form has been gone through seven times are the needles deemed properly conditioned, but they then emerge in a state of lustrous polish and perfect smoothness. They are sent on to undergo subsequent manipulations, of which "evening" consists in shaking them in trays to form rows—a job performed by girls, and one requiring more dexterity than may at first sight appear.

"Handing," as it is termed, is another manual process for eliminating needles of unequal lengths. In the preliminary process of needle making, viz., cutting the wire, a "cutting measure" is, as we have seen, used to ensure regularity of length, but in the many subsequent processes the needles go through it is unavoidable that some should undergo modification in length. At the same time it is very important that those of a regulation size, say No. 3, should be exactly uniform. The "handing," therefore, takes a row of needles, brings the heads flush with a plane surface, and then lifts out by the points the longest, which are put aside as the "first handing." She deals with the residue on this plan, making in all five or six handings.

To get the heads all one way is the object of "heading," performed by a little girl who simply covers her finger with a piece of calico, and, by pressing it against a row of needles, extracts those with the points turned that way. While proceeding thus with great despatch, she also sorts out all faulty needles, i. e., such as are bent or broken. The needles are next weighed into packets of 1000, mainly to enable the firm to judge whether proper economy has been observed in the manufacture, and to check the raw material used.

Preliminary to drilling the eyes, the heads are "blued" by momentary contact with a block of red-hot iron. The "burr," or roughness inside the eye of the needle, is removed by the action of a miniature revolving drill, and the needles are now fit for the finishing processes proper. These consist of grinding the heads, setting the points, "curing" or dissipating dust, &c., that may have accumulated in the eyes, "bluering," i. e., removing the blue color of latter, and polishing by means of revolving discs covered with leather. Great care is, of course, exercised in the finishing, and the various stages of manufacture call for no little watchfulness and attention. The needles are packed in numerous ways, but great quantities are put up in paper cases, each containing 25. Paper known as "purple," of peculiar make, and impervious to damp, is used, the crasing of the packets being accomplished by aid of ingenious machines. After being labelled, the little packets are removed to a dry room to ensure the removal of all traces of dampness.

Thawing Frozen Water Pipes with Steam.

A few days ago the New York Times published an absurd editorial on plumbing and plumbers, in which it told how pipes could be thawed out by means of a tin can and a bit of flexible tubing. A plumber writes as follows in reply:

Your correspondent's idea of a tin can, with a loosely fitting cork, to thaw out 50 or 60 feet of service pipe is simply ridiculous. No practical man would attempt it with such a clasp-trap arrangement. I do not believe it possible to do it. It requires more steam than such an arrangement could possibly supply. There is no necessity of building fires in the streets unless the service pipes are frozen clear to the mains, and not in all cases then. At the main where the service pipes are connected, are some short turns, which are very hard to get through, and where the service pipes are small, it is almost impossible. When the plumber has thawed the service pipes to this point, and cannot get any further, he finds it necessary to dig down to the main, and as the paving stones are frozen so hard it is necessary to build fires so as to warm them; then they can readily be removed. When the stones are removed a sharp crowbar and pick, with a smart man to use them, will remove more frost and dirt in five hours than a fire would in ten. Where the service pipes run straight from the building to the main (I mean by straight no sharp turns), it is not a difficult job to thaw them out if you have suitable apparatus for doing it. The best plan that I know of is to have a boiler made either of iron or copper (the latter I think the best), said boiler made so that it can be used on the kitchen range when convenient; if not, use a charcoal furnace. The boiler should be strong enough to carry with safety 25 pounds of steam. With such a boiler, and a steady pressure of eight or ten pounds of steam, a service pipe of 40 to 60 feet can be cleared of ice without any trouble, provided there are no short turns, and I think an honest price for doing a job of that kind, say 40 to 60 feet, is \$16 to \$20. A boiler made of copper, tested at 25 pounds, with a safety valve and a globe valve to regulate the supply of steam to the service pipe, any practical plumber can make for \$17. I should like such jobs at the prices given.

The Water Supply of London.—The amount of water supplied to the city of London during 1874 was something like forty-five thousand millions of gallons. The daily quantities in each month of the year were as follows:

1874.	Gallons per diem.	Houses supplied.	per head per diem.
January.....	109,118,570	508,229	21-3
February.....	109,013,458	508,465	21-5
March.....	109,514,116	508,814	21-6
April.....	112,124,179	509,017	23-4
May.....	121,261,889	510,083	23-7
June.....	125,698,091	510,499	24-6
July.....	127,561,248	512,203	27-5
August.....	127,649,788	512,340	27-5
September.....	120,871,501	512,825	27-5
October.....	116,336,486	513,250	27-2
November.....	111,277,252	513,772	27-7
December.....	108,947,278	514,118	27-4
Yearly average	116,451,402	511,178	24-9

About 60 millions of gallons were derived daily from the Thames, about 30 millions from the Lea, and the rest from deep wells in the chalk, and about 80 per cent. of the daily supply was used for domestic purposes.

Reasons for Using our Goods.

Hogs when ringed are prevented from rooting, and fatten quickly.

Pastures and clover fields are kept smooth and are not destroyed by the hogs rooting them up.

Feed lots in the winter are kept smooth, and corn that is otherwise rooted and tramped into the ground is saved.

The **Triangular Wire Ring**, manufactured only by us, is the only wire ring that can be inserted in the hog's nose with one grip on the **finger**, and is the only ring that will remain in a hog's nose, as it fits close, will not turn in for the joint to irritate the nose, is not liable to be torn out, and heals quickly.

No puncturing of the nose required to insert our ring.



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We shall this present season make a **Heavy Tinned Wire Ring** that will not rust in the hog's nose. The strongest and best ring in the market.

Prices.

Rings, retail.....	\$1 00
" per doz.....	8 00
Rings per box (100) coppered wire.....	80
" per doz boxes (1000).....	3 00
" per box (100) tinned wire.....	60
" per doz. boxes (1000) tinned wire.....	4 00
Tongs or Holders retail.....	1 25
" per doz.....	9 00

The coppered wire ring will be sent unless otherwise ordered.

Samples by mail postpaid on receipt of retail price.

Goods sent C. O. D. with privilege of examination before paying charges.

Net prices in quantities, circulars and posters mailed free.

Our advertisements are now inserted in over 1800 newspapers, published in every State of the Union, so that dealers will find large demand created for our goods.

THE NICHOLSON FILE.

All *Nicholson Files* are cut with the *Patent Increment Cut*, an invention owned and controlled exclusively by us, the file cut in this manner being Patented as a new article of manufacture, and differs from all other machine cut files (all of which have their teeth cut with equal spaces) by being cut with teeth slightly *expanding or increasing in size and space from the point*, thus avoiding the too great regularity of teeth common to all other machine cut files. The tendency of all cutting tools with teeth or cutters placed at regular distances from each other may be illustrated (to the machinist at east) by the fluted reamer—as it is well known that if a round reamer be made with (say 12) teeth whose spaces are equidistant, the hole reamed will *not* be round and smooth, but will approximate to a hexagon in shape. Whereas, if the same number of teeth be made of irregular distances, the hole reamed will be both round and smooth. The same is true of a file, hence the necessity of its having teeth at unequal distances, and to which we have applied the name of *Increment Cut File*, which possesses all the advantages of hand cut work, and the accuracy and uniformity of machine work. It is now upwards of seven years since this File was introduced to the public, and the demand has increased until our production is undoubtedly treble that of any File manufactory in the country.

We put all files under seven inches in boxes of either one-half or one dozen each. These boxes are neatly arranged, and open on the end, on which the kind is plainly marked with printed labels, acknowledged improvements on the old methods.

The "*Increment File*" is not an experiment, but an established fact, and already has acquired a legitimate demand or upwards of 500 dozen per day. We employ no *regular Travelers*, but our goods may now be found in the hands of the principal jobbers and dealers throughout the country.

Prices and terms will be forwarded on application to

NICHOLSON FILE COMPANY,
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The American File Company have the exclusive right to use the Bernot process for cutting files. By this method all the advantages of hand cutting are secured, together with an accuracy unattainable in hand work. They are the only manufacturers who employ machinery for testing files and steel.

Goods of all known manufacturers have been repeatedly tested, and interesting tables have been compiled showing the working qualities of files made by different makers, and of files made from different steels, and with various shapes and angles of tooth. They have thus reduced the manufacture of files to an exactness and perfection with a uniformity of result, as they believe, never before attained. No file, foreign or domestic, that they have ever tested, has equalled the performances of their own goods taken at random from their stock. Their machines are capable of the most delicate adjustment, and can produce the very finest work known to the trade. Special files made to order. Prominent file manufacturers are having their best goods from our works.

Price lists and information furnished on application.

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Of any File Works in the World.
In the face of strong prejudice against American files, this brand has earned a reputation second to none. The trade in all sections testify to their excellence. We confidently offer these files as superior in every respect and cheaper than any first-class file in the market. A trial will confirm their reputation.

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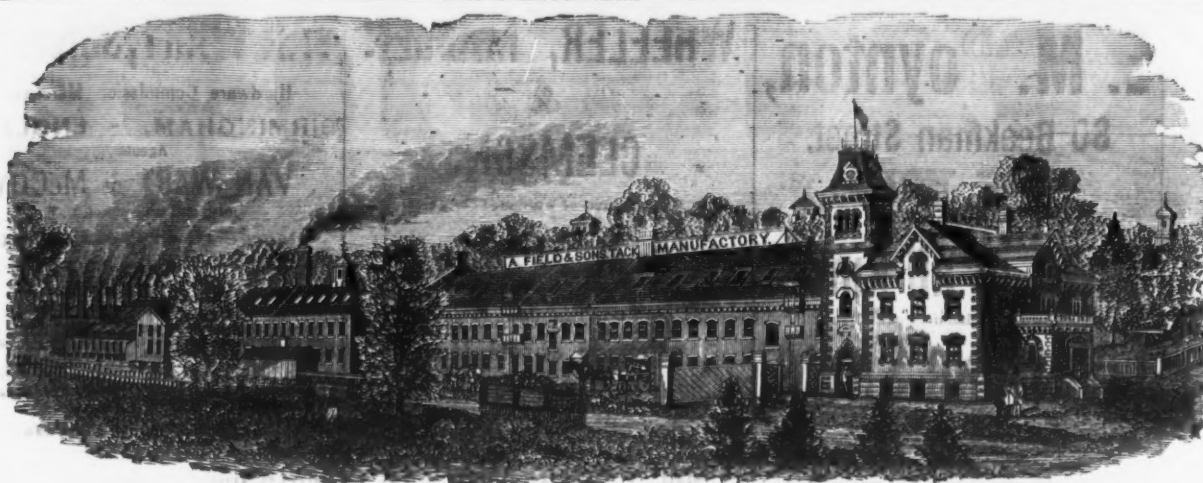
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32 Cliff Street, N. Y.

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Anthracite Pig Irons,
COLD AND WARM BLAST CHARCOAL IRONS,

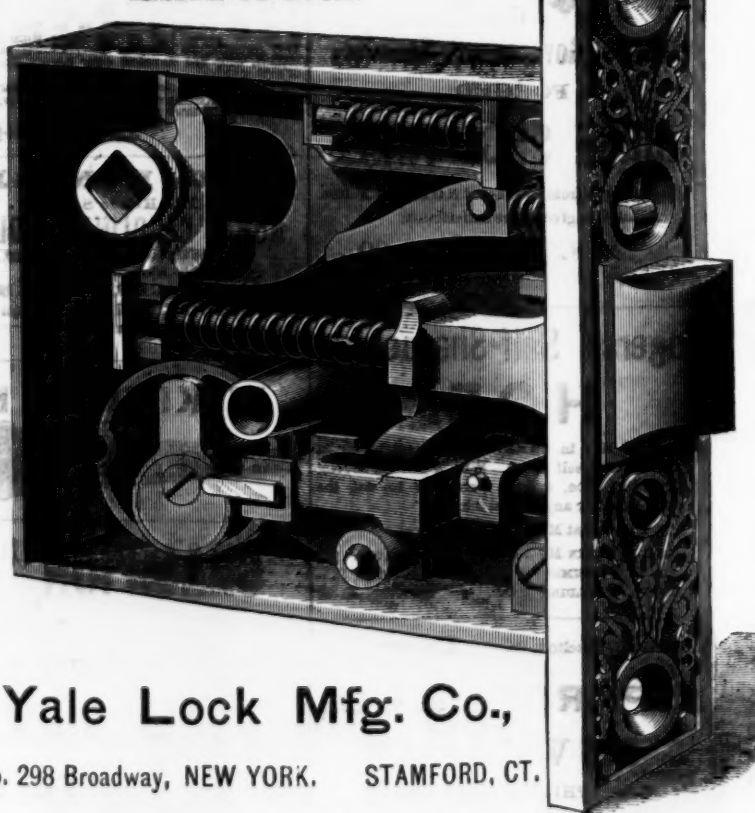
American and English Bessemer Irons, Iron Ores.

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Advances made on Merchandise.

Yale Mortise Night Latch No. 70.

WITH CAP REMOVED SHOWING
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Yale Lock Mfg. Co.,

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**THE
Empire and Monitor
Lawn Mowers**

Have been before the public several years, and have given universal satisfaction. Therefore it is not necessary to make lengthy comments, only to say they are the lightest and strongest mowers in the market; also, for simplicity of construction, durability, and lightness of draft, they are acknowledged to be superior to any machines made. They are sold at *reduced* prices.
MONITOR, 10 in. cut, \$15.00
EMPIRE, 15 in. cut, \$20.00
Agents wanted everywhere.
MANUFACTURED BY

BARLOW & WALKER, Sing Sing, N. Y.

BUSINESS ITEMS.

NEW JERSEY.

A steam fire propeller, called the William H. Havemeyer, for the New York Fire Department, is now being furnished with machinery and fittings at Camden, and will be completed within two weeks. The vessel will cost \$25,000, and will be manned by twelve men, including her captain and two engineers. Her pumps are of the same kind as those on the street fire engines, but of greater capacity, and can be made to throw twelve streams of water. They can be brought to bear on fires among shipping and upon burning buildings a block away from the river. The Havemeyer will also be useful in separating vessels from burning ships or sheds.

An iron shipbuilding establishment is to be erected at Bordentown, on the Delaware River, which shows that the whole length of the Delaware, as far as tide water reaches, is available for this business. There are now along the valley of the Delaware five iron ship yards; one at Philadelphia, one at Camden, one at Bordentown, one at Chester and one at Wilmington.

PENNSYLVANIA.

The Scottsdale Rolling Mill, of Everson, Knapp & Co., and the blast furnaces of Knapp, Macrum & Co., at the same place, give employment to 200 men, and will probably employ 50 more when their narrow gauge railroad is completed.

The Union Foundry, at Catasauqua, has increased a day's work to ten hours, and has all its workmen in employment.

Messrs. Weimer & Birkinbine, of the Weimer Machine Works, at Lebanon, are shipping the necessary material for the reconstruction of the Leesport Iron Works. They will put up their patent bell hopper, which is worked by steam instead of by hand.

The Bethlehem Iron Company, of Bethlehem, has the contract for the steel rails for the North Pennsylvania's new line from Philadelphia to New York. They are to be 66 pounds to the yard.

The Erie City Iron Works recently received orders for the construction of ten boilers, from one source, and twenty from another. They received an order from the Island of Porto Rico for a large boiler, and have already commenced work on the same. The plates of which the heads are formed are one inch in thickness.

Messrs. Van de Sande & Cuy's rolling mill, at Lebanon, have orders on hand for several months' brick work.

The Susquehanna Iron Company's rolling mill, at Columbia, is running full double turn with large orders on hand.

It is rumored that the new furnace of the Glamorgan Iron Company, in Mifflin county, is to be blown in about April 1.

The Easton Dispatch says the East Penn Iron Company, whose works are situated at Lyons station, disposed of \$60,000 worth of stock to the Hereford Iron Company, of New York. Mr. John Noble, of Pottsville, also sold \$20,000 to the same parties. This purchase will give that company a controlling interest, and the furnaces will be blown in as soon as coal can be procured. They will make a specialty to produce only "steel iron."

The light locomotive works of Porter, Bell & Co., of Pittsburgh, are running nine hours per day.

The Lebanon Manufacturing Company have an order for 400 four-wheeled coal cars from Nova Scotia, to be finished in five weeks; also, a contract to furnish 300 hand pumps, for a Palmyra firm, and a quantity of corn shellers.

MASSACHUSETTS.

The Brainard milling machine works, at Hyde Park, are to be extended by the addition of a new building, and the manufacture of vices will be resumed.

The Bridgewater Iron Company have just completed a new rolling mill, being an extensive addition to the large mill which has been built many years. The engine is a new one of nearly 500 horse-power, 40 inch cylinder, 6 feet stroke, with a fly-wheel 25 feet in diameter, weigh 35 tons. This machine was mostly built in the works of the company, and is a model of strength and beauty. The velocity of the large wheel at full speed is at the rate of a mile per minute.

The Lamb Knitting Machine Company, of Chicopee Falls, will not remove their works to Holyoke, as has been reported.

CONNECTICUT.

A new industry is to be established at Bridgeport, consisting of the manufacture of Page's new type-setting machine.

OHIO.

Cartwright, McCurdy & Co., of Youngstown, are running their old mill on hoop iron to its full capacity.

The Canton Bridge Company has just completed a bridge over the Mahoning River at Spring Common.

The proprietors of the Toledo Stove Works commenced operations in July, 1873, with a force of 21 men and a boy, and ran two heats a week, melting 1500 pounds of pig iron. Now they employ 27 men and four boys, and melt 8000 pounds of iron a day. It is intended to put in an additional furnace in the spring, and melt 10,000 pounds per diem.

Turner, Parks & Co., of Cuyahoga Falls, manufacture grain cleaning machinery, middlings, purifiers, wire drawing machinery, sewer pipe and paper mill machinery. The works consist of a foundry 35x100 feet, machine shop 40x50 feet and two stories, flour mill 38x50 feet, with two pairs of burrs, &c. Employment is given to 45 hands, and the annual production amounts to \$75,000. The goods are marketed throughout the United States and in Germany.

Parties from Pittsburgh and Minnesota want to establish a reaper and dropper factory at Salem. A \$25,000 loan will bring them.

The American Sheet and Boiler Plate Company, of Newburg, are making extensive re-

pairs, and will put their works in operation in a few weeks.

The Elyria Screw and Tap Factory is now fully in operation, giving employment to 20 hands.

The Gaylord Rolling Mill Company, Portsmouth, has received an order which will keep it running on full time for the next six months.

Aultman, Miller & Co., Akron, manufacturers of mowers and reapers, have just commenced introducing their machines in Europe, the European headquarters of the company being at Leipzig, Germany. The annual production of the company is now 10,000 machines, and employment is given to 400 hands, the monthly pay roll amounting to \$30,000. The works have a frontage of 550 feet, are 200 feet deep, and three stories above the basement. The works are being run to their full capacity.

The sewer pipe works of Sperry, Richie & Co., at Talmadge, are being enlarged to double their capacity.

At the Akron Boiler Works, J. C. McNeil, are manufactured boilers and all kinds of sheet iron work. The works are 30x80 feet, and all the machinery is run by steam. Employment is given to 30 hands, and the annual production amounts to \$40,000, the capacity of the works being equal to a production of \$70,000. The product is sold mostly within a radius of 40 miles, though within the last year a number of boilers have been sold to go to Indiana.

INDIANA.

The Indianapolis Rolling Mill started up February 18, on a heavy contract for the Indianapolis, Bloomington and Western Road. The rolling mill company is said to have sufficient work under contract to keep running until the middle of April.

The Ohio Car Works, at Jeffersonville, has secured the contract to build 20 cars for a narrow gauge railroad.

ILLINOIS.

A steam engine has just been completed for the Choctaw nation by the Greenleaf Manufacturing Company, of Quincy.

The Baltimore and Ohio Railroad Company's car shops in Chicago are occupied for business, and 400 men will be employed.

WISCONSIN.

During 1874 the Milwaukee Iron Company added to its works a merchant bar mill, the building for which is 216 by 109 feet. It contains a 9-inch, a 12-inch and a 21-inch train of rolls, and space is left for an 18-inch train. There are three Siemens heating furnaces. The capacity of the new mill is 18,000 tons of finished iron per year.

MISSOURI.

The Vulcan Iron Works, at St. Louis, have been enlarged by the addition of a new mill containing trains for rolling light rails, from 30 to 45 pounds per yard. The new mill has a capacity of 60 tons per day, making the whole capacity of the works 200 tons of heavy and light rails per day.

Outrages in the Mining Districts.

A letter from Hazelton, Penn., under date of Feb. 28th, says:

During the last few weeks a number of outrages have been committed in the Lehigh region, which culminated yesterday morning in the burning of an engine house and the shooting of a man. The outrages began by a large gang of men appearing at night, and ordering away the men who were working the new slope at the Council Ridge Colliery. This occurred about three weeks ago. Since that time large crowds of men of from 100 to 300, armed with guns, pistols and other weapons, have been marching through the region at night, destroying property, firing into houses, and using the weapons to intimidate those at work, the principal object being to stop the pumps, and cause the mines to fill with water.

On Tuesday night they visited the Highland Colliery, broke into two houses and destroyed the furniture belonging to the men running the pumps. The also drove away the men sinking a new slope at the same place. They then went to the Upper Lehigh and committed the same kind of depredations, and drove off the pump men. They then went to Woodside Colliery, and broke into a house and destroyed the furniture of a man whose son was working in the mines, and threatened the pump men.

About 2 o'clock yesterday morning, the miners who are on strike, numbering about 800, drew the fires from under the boilers, strapped all the pumps, set fire to the engine house, and shot one of the engineers at Buck Mountain, 11 miles from here. The man is not severely wounded. It is almost impossible to get men to keep the pumps going. The police are assisting to do so at Eskey and Upper Lehigh. There are apprehensions of rough times around here. The men are gathering in large numbers at the Highlands. Three miles from this place a severe disturbance has taken place, and two men were badly beaten; one of them, report says, cannot survive. The police have been sent to Buck Mountain to start the pumps.

From Pottsville the following intelligence comes under the same date: The Philadelphia and Reading Coal and Iron Company have again had a loss by fire through incendiarism. Dispatches received from Glen Carbon in this region yesterday state that several miners' houses, unoccupied and owned by the Philadelphia and Reading Company, were set on fire twice. Each time the fire was put out by the firemen and watchman on duty at the mines close by. The third time it had gained such headway that they were unable to subdue the flames. Several men were seen running from the building by the watchman; but, owing to the darkness, he was unable to identify them. Though the loss is small, it shows an increase of bitter feelings toward the company. The troubles with the miners at Hazelton are increasing in violence. Inquiries were made here to-day for 15 picked, able bodied men to go there immediately to guard and act as policemen at the works. The required number being ready for orders, more will go forward if called.

From Pittsburgh we learn that a disturbance occurred on Friday last at the Loyalhanna Mines, about a mile east of Latrobe, in Westmoreland county, in which five men were used. The miners employed at these mines struck about two weeks ago, and the trouble yesterday originated from an attempt on the part of the company to supply their places with new men. President Baker and secretary Walk were knocked down and disarmed. Two miners were reported wounded. The Deputy Sheriffs arrested the ten miners this morning and lodged them in Greensburg Jail, and it is stated that deputies are at the mines this evening making more arrests.

GEORGE GUEUTAL & SON,

39 West 4th St., New York.



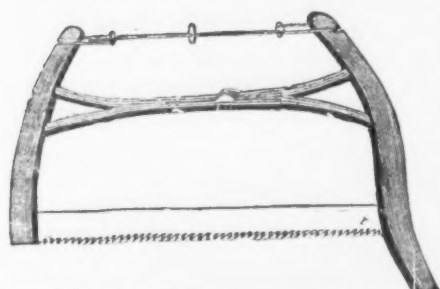
IMPORTER OF
Wood Screws, Steel in Sheets,
BAND SAWS, TOOLS FOR BRAZING, &c.
Bed Screws, Pin Hinges, and Wire Nails a Specialty.

H. W. PEACE,

MANUFACTURER OF

Saws of all kinds.

FACTORY, WILLIAMSBURG, N. Y.



Elliptic Forked Saw Frame.

Patented June 29th, 1870.

The annexed engraving represents my ELLIPTIC FORKED SAW FRAME, which commends itself to the trade for its simplicity of construction. The Forked Frame being all in one piece, without any center bolt, secures for the Frame great strength and durability. These Frames are put up with my best Webs, marked "No. 40, Harvey W. Peace."

HARVEY W. PEACE,
Sole Proprietor & Manufacturer,
VULCAN SAW WORKS,
WILLIAMSBURG, N. Y.

**THE SILVER STEEL
DIAMOND CROSS-CUT SAW.**

\$1.50 Per Foot.

Patent Secured

THIS new Saw, which is destined to take the place of all Cross-cut Saws in point of **SPEED AND EASE**, is manufactured by **E. C. ATKINS & CO.**, Indianapolis, Ind., who are the **SOLE MANUFACTURERS FOR THE UNITED STATES.** So confident are we that this is the best Cross-cut Saw in the market that we **CHALLENGE THE WORLD.** Orders promptly filled.
E. C. ATKINS & CO.
Saw Manufacturers and Repairers, Indianapolis, Ind.

**Lloyd, Supplee & Walton,
HARDWARE FACTORS.**

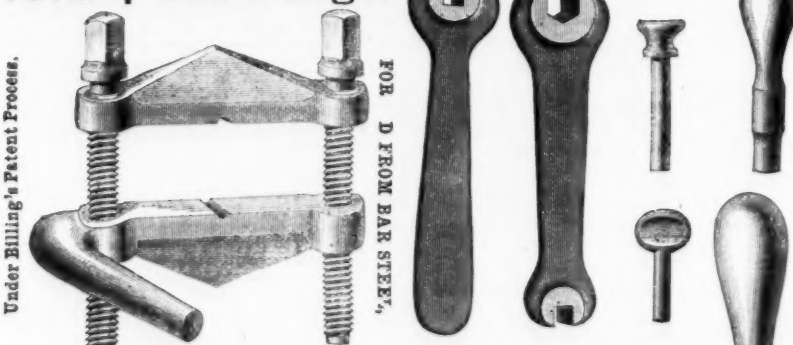
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AUGERS.**Stearn's Hollow Augers
and Saw Vises

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Double Edge Spoke Shaves
Adjustable Gate Hinges
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Flat Key Brass and Iron Pad Locks, &c., &c.

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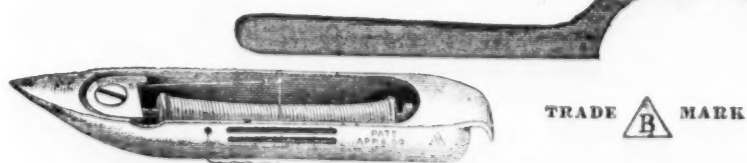
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Clamp Lathe Dogs.**

And Hardened.

A First-Class Article, and something that every machinist and Tool Maker will appreciate.

WROUGHT IRON AND STEEL DROP FORGINGS

of every description. Machine Handles, Lathe Wrenches, Thumb Screws, Milling Machine Cranks, Spanners, Parts of Sewing Machines, Guns, Pistols, Drill Chucks, and MACHINERY GENERALLY.



THE BILLINGS PATENT SEWING MACHINE SHUTTLE,
Thirty Varieties now made, Forged Solid from Bar Steel and Cold Pressed. Also,
The Barwick and Wheatcroft



Patent Self-Adjusting PIPE WRENCHES, of all sizes.
Illustrated Circulars and Price List sent to any order on request. Lawrence St., Hartford, Conn.

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Manufacturer of

Saws of all kinds.

Also Sole Manufacturer of

LIGHTNING SAWS.

Two Direct Cutting Edges, instead of one Scraping point.



Note extra steel and durability over the old V, outlined on M tooth.

Telegram Dated Oct. 1st, 1874.

STATE FAIR, EASTON, PA.

To HENRY DISSTON & SONS:

Philadelphia, Pa.

I want you to publicly test that challenge on Cross Cut Saws. Name time and place within thirty days. American Institute preferred. E. M. BOYNTON.

E. M. Boynton gave on Wednesday of last week an exhibition of what his Lightning Saw could do at the Pennsylvania State Fair, in which two men sawed through a sound oak log, 16 inches in diameter, in 17 seconds. Mr. Boynton informs us that his export trade is increasing, he having lately made large shipments of his saws to Australia and other distant markets.—*The Iron Age*, Oct. 8, 1874.

For fuller report of this exhibition see the *Eastern Morning Dispatch* of Oct. 1st, 1874.
Henry Disston & Sons cannot furnish Lightning Saws. Why do they imitate mine?

**J. FLINT,**

Manufacturer of

**ALL KINDS OF
SAWS**

And Plastering Trowels,

ROCHESTER, N. Y.

A large Stock of Cross Cut Saws constantly on hand. Orders filled promptly. *Bietrich's Double Handle One Man Cross Cut Saw* made with any kind of tooth desired. Our patent method of grinding Hand Saws makes them superior to any in the market. send for Illustrated Price List.



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FORGED**

HORSE SHOE NAILS.Manufactured from the best of **NORWAY** Iron, and warranted to give entire satisfaction.

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**Rogers' Self-Sharpening
HOE.**

The best Hoe in market. It will not batter or break. Wears itself sharp. Will last twice as long as any other Hoe, and is warranted to cut the "Bolles Hoe" or any Hoe in market.

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303 Walnut St.,**

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Manufacturers of Warranted Cast Steel

SAWSof every description,
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other Wood Saws,
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Cast Steel Files

of the well known brand of

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FACTORIES:

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BEST NORWAY IRON,by **BRUNDAGE & CO.** Sold by**WHEELER, MADDEN & CLEMSON****Middletown, Orange Co., N. Y.**

I make a specialty of the **LARGEST SIZES** of Circular Saws, and call particular attention of lumber manufacturers to the following points of excellence: **Evenness of Temper.**—The peculiar structure of my furnace subjects all parts of the saw to a **DEAD** heat, and when dipped in the oil bath secures perfect uniformity.

Perfect Accuracy in Thickness.—My saws are ground on a patent machine, automatic in its operation, grinding off the thick places upon the plate before the thinner parts are reached, and when the saw is removed **BALANCES PERFECTLY**, which is proof positive of the right accomplishment of the work.

Properly Hammered.—Great care is taken that no saw shall leave my works without due attention in this important particular. A saw too tightly strained upon the rim, or too loose in the center, cannot be successfully run—hence the importance of so hammering the saw as to effect equal strain in all its parts, and at the same time **RUN TRUE**. This department is under the personal supervision of myself, who has devoted over twenty years to the art of saw making.

I am sole proprietor and manufacturer of the celebrated "**Challenge**" Cross-Cut Saw. Price Lists of all kinds of saws sent on application.

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105 Reade St., N. Y.****NORTH CAROLINA HANDLE CO.,**

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**AXE, PICK, GERMAN & AMERICAN
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Full assortment always on hand.

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Send for special discount sheets.

"CHAMPION" Hog Ringer and Rings.

The only Ring invented that will effectually prevent Hogs from Rooting. Being a Double Ring it is equal to two or three of any other Ring. Having no sharp points in the flesh, it does not cause irritation or soreness as in other Rings. The smooth part of the wire being in the nose, it bends rapidly. One of our rings being equal to two or three of any other ring, makes this ring cheaper than the cheapest ring in the market. Time and money saved in using the Champion Hog Ringer. One operation and the work is done.

Price of Hog Ringer, 75c. each. | Price of Tinned Hog Rings, 60c. per 100.
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Discount to the trade.

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At each of these places a complete assortment of samples of Hardware and Fancy Goods will be found, including all new descriptions. Sole Agents for
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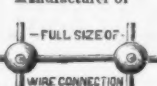
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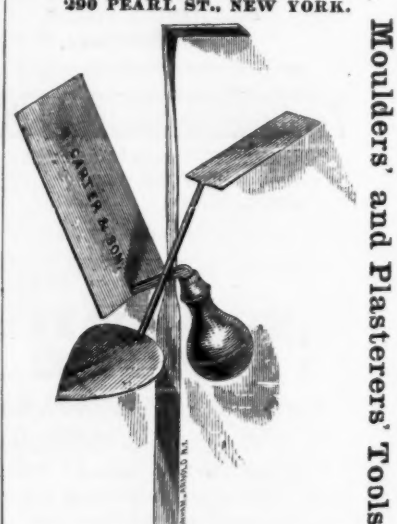
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Manufacturers of and Dealers in all descriptions of
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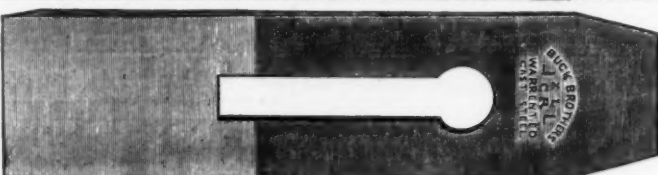
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The only knives made that are put together in such a manner that there is no strain on the covering or fruit of the knife. We warrant our knives equal in cutting qualities and workmanship to any made, and are acknowledged by English makers as the **Best American Knife**. We also make

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The most complete assortment in the U. S. of Shank, Socket Firmer, and Socket Framing Chisels.

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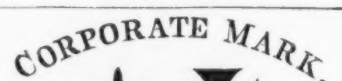
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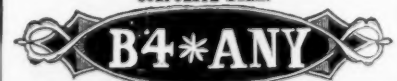
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We would call the attention of jobbers to the necessity of sending orders early in the season for the



Automatic Muzzle, which must supersede all others. It has the endorsement of Mr. Bergh, and is one of the best and most humane inventions of the age.

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Carriage, Machine, Plow, Stove and Tire Nails, Coach Screws, Bed Screws, &c.

IRMINGHAM, CONN.

PHILADELPHIA CORRESPONDENCE.

PHILADELPHIA, March 1, 1875.

Considerable trouble and loss have been experienced by the manufacturers of this city whose works are located on the banks of the Schuylkill river, from the flood caused by the ice gorge. In some instances the mills are flooded to the second floors, beside being greatly damaged by floating ice. Much machinery and goods have been injured, while the loss to private dwellings has also been very great.

These floods have not been unusual accompaniments of severe winters, but the greater damage sustained this season is said to have been due to the rule of the Park Commissioners which prohibited the cutting of ice on the river included within the park limits, and which left a solid body of unusually heavy ice to act as a dam against the increased flow of water caused by the late heavy rains. Next to this matter, as the ruling subject of gossip, comes the scarcity of coal, which has reached a point which threatens to put a stop to all Pig Iron production, in the Schuylkill Valley at least. Had it not been that most of the furnaces of this region had been idle, or nearly so, for a long time, there would not now be enough coal to keep any furnace in blast; as it is, the supply is now entirely exhausted, and it is only by buying from furnaces out of blast that those at work can continue. The effect of this scarcity will be to advance the price of Pig Iron and to throw large numbers of men out of employment. Unless the difficulty with the miners can be settled, a large majority of the anthracite consuming iron works must go out of operation. Of a settlement there seems just now little prospect. A meeting of the Executive Board of the Miners and Laborers' Association was held in Pottsville on the 26th inst., and in addition to the members of that, was attended by those of the Mechanics' and Workmen's Association, the latter composed principally of railroad employees, who announced the discharge of a number of their officers from the employ of the Reading Company, on account, as alleged, of their being officers. Resolutions condemnatory of this action were passed. A committee was appointed to aid in discovering and bringing to punishment the incendiaries who set fire to the fan-house of the East Norwegian shaft, if it was an incendiary fire, but the committee stated their ability to prove it entirely accidental. They further claim that the reward of President Gowen of \$10,000 for information which would lead to the arrest and conviction of the incendiary was only made to influence sentiment against miners. The most important action taken was the adoption, almost unanimously, of a resolution demanding, after March 1, a basis of \$2.75 for contracts at \$3 for day labor. This is an advance of 8 1/2 per cent. over prices of 1874, against an offer of a reduction of 40 per cent. by the operators. Hence it will be seen that no very good prospects of a settlement appear, and the outlook for the production of anthracite iron is very bad.

The annual report of the Pennsylvania Railroad Company has just been issued, this week, in compliance with the recommendation of the Committee of Investigation last fall, that the reports be issued long enough before annual meetings to allow stockholders to become informed of the condition of affairs. It is unnecessary here to enter into details of the report, as it will doubtless be noticed in your columns. The figures given show the affairs of the company to be in excellent condition, while the cost of operating the road, including all the branch lines, in 1874, was under 58 1/2 per cent. of the receipts, and of the main line, but 54 1/2 per cent. of the receipts. The statement in reference to the amount of steel rails on the road shows it to be far in advance of any road in the country in this respect. No better explanation of the dull times felt by the iron trade need be sought than the figures which show that the amount expended in 1873 for construction account was twenty millions against only three millions in 1874. A large proportion of the report is devoted to the improvements made and proposed at the Philadelphia and New York termini. Ample preparation is to be made for Centennial traffic, and the announcement made that it is not proposed to hasten to obtain any further extension of railroads beyond completing contracts now made. The report should be a satisfactory one to shareholders, and certainly shows the company to be managed with great ability.

The annual report of the Lehigh Coal and Navigation Company, for 1874, shows, also, a very favorable condition. The total receipts from railroad, canal and coal lands were \$1,729,582, including three dividends of 2 per cent. each. The coal tonnage of 1874 was 3,071,487 against 3,176,280 tons in 1873, being a decrease of 104,793 tons. The experience of the company as to the working of the contracts under which its property is rented, justifies them in stating that eight per cent. per annum can be regularly paid from their income, with a prospect of an advance on this rate very soon.

The Insurance Commissioner of Pennsylvania has just issued a report, which includes some very valuable statistics of the capital of and property insured by the sixty-two Insurance Companies chartered by the State, which number does not include mutual or life companies. The aggregate cash capital of the sixty-two companies referred to is \$10,187,384, with gross assets on Jan. 1st, 1875, of \$28,515,414, and liabilities, including capital and reinsurance, of \$22,780,790, or a surplus of \$4,734,600. The cash premiums received in 1874 on fire risks were \$8,919,839, with losses paid of \$4,431,811. The total amount of risks underwritten in 1874 was \$699,998,423. These figures are stupendous, and show to what an extent the insurance business has grown in keeping pace with the progress of the country.

An account of the discovery of an immense natural gas factory, in the shape of a burning well at Tarentum, in Butler county, has just appeared. This well is 1145 feet deep, and had struck the first sand rock, and the flame of burning gas is 40 feet long and 15 wide, giving a light which can be seen 13 miles at night. The heat in the vicinity is tropical, trees and grass growing now as in summer. Parties are preparing to attempt the utilization of this natural fuel, and if it can be piped, and the tools now in it extracted, the supply of gas would be sufficient for the use of all the iron works even of Pittsburgh. Probably the subject of gas fuel is yet entirely unknown, and in the near future we may see, not oil transported in pipe lines or coal on railroads, but a gas fuel generated at oil or coal regions and brought long distances in pipes to manufacturing centers for all the uses of heating and illumination. Nothing can be of greater importance to our industries than such a supply of cheap fuel.

Foreign Metal Reports.

FRANCE.

(Monteur des Interests Materials.)

PARIS, Feb. 14, 1875.—Metals.—Business in the European Metal trade in general seems to be picking up a little, but the headway has far made is but slow. The elements at hand for a satisfactory spring campaign are, however, of an encouraging nature. Money remains cheap. No disquieting political topics have of late come up for discussion; no

famines threaten the near by or remote populations with whom we deal; there will be great activity in repairing and building railroad lines both in Europe and Asia during the summer time; and in the event of another bountiful harvest succeeding the last one, we may feel tolerably assured that commercial, as well as industrial, affairs will develop in a more satisfactory manner than was the case in 1874. Copper.—We are glad to perceive that the demand for India is looking up in England, and that enough shipments thither begin to be made direct from Australia, it amounts to the same thing, inasmuch as Europe will get that much less from the latter country. Some such extra demand from colonial countries was very much needed. We have been quite content here at the following quotations: (Chili Bars, deliverable at Havre, 220; Common ditto, 215; Ingots, 227-50; English Tough Cake, 227-50; and pure Corcoro Ore, 217-50. Havre remains steady as follows, cash, just 4 per cent.: Chili Bars, 217-50 to 225; ditto Refined Ingots, 222-50; pure Peruvian Ore, 220 to 225; and Lake sup. rior, 245 to 250 francs. Marseilles has remained well sustained at 220 to 225. Refined Chili Ingots, Tin.—The general European market has been devoid of animation throughout the week, with a considerable degree of weakness in Holland, while in England at least an important decline has been prevented through the firmness with which the metal is held, Australian in particular, which daily gains in favor. Markets are very much unsettled, and toward the close of the week Tin also drops 30 in the London market. At or below £200 the latter may, however, invite speculation, superinduced by the prevailing low discount rate, and the facility with which it can be handled on purchases abroad. Tin has recovered to 56-10 in Holland, but subsequently dropped nearly a guinea, in order to finally settle at 53 1/2. The mischief is that Tin shipments through the Suez Canal have been so quick that during the dull season, the winter months, stocks cannot be kept from accumulating a great deal faster than the slackened consumption can take care of. An active demand in spring is therefore always absolutely necessary in order to replace the statistical position on anything like a reassuring footing. The market has kept tolerably firm here under the circumstances, on the basis of 257-50 for Banca, there or at Havre, Straits have come down to 250, and English at Havre or Rotterdam 250 francs. Havre, will closely following the London fluctuations, stays firmly in the end at 260 for Banca, and 255 Straits. Marseilles, where the Straits affairs have been discounted, has settled down to 250 francs for Banca, and 245 for Straits and Billiton. Lead.—A slightly improved feeling has begun to manifest itself in the London market, and it looks as though the metal had for the time being touched bottom. Perhaps the decline of 15 during the first four weeks of the new year had been too precipitated and not warranted by the facts connected with the position of the metal; in reality not abundant in the hands of either dealers or consumers. The decline experienced in the French markets has also been considerable, and we now close steady at 58 to 59 francs here, 54 1/2 at Havre, and 52 at Marseilles. These figures are not high ones. Spelter, though there is but a moderate supply at any one of the ports, begins to attract less attention, and moves off slowly at the enhanced rates demanded. Silesian here in Paris is 18 1/2 to 19, 64 francs. Marseilles and Havre remain unchanged. Iron.—Iron industry in France has been kept in a state of tranquillity, activity being restricted to the execution of small orders and the larger ones under contract for some time past. Prices are low, due in a measure to the anxiety of some new concerns to get some little business. A few large works are active on rails and plates for iron-clads. Some steel works are also doing orders of a certain magnitude. Paris is quiet on the basis of 230 francs for No. 1 Merchant Iron, and 290 thick sheet. The North and the Ardennes are quiet; the latter are slightly looking up. Coal.—The downward tendency has made good progress, and is likely to continue some time longer. We are down to 41 francs here for half grossy Coal.

BELGIUM.

(Le Commerce.)

BRUSSELS, Feb. 14, 1875.—Iron.—If the South Welsh lock-out be not settled in some amicable manner, like, for instance, by arbitration, within a month or two, not a blast furnace will have been kept going in that important region, and the Cleveland and other districts will have to be resorted to in order to fill pending orders, and prices will rise not only in England, but on the Continent, too, especially in our own country. The Minister of Public Works has promised to investigate the question of steel rails in consequence of some of them having been broken during the late severe frosts. It is presumed because they held too much phosphorus. Belgium exported 108,204 tons of iron in 1874, or about 106,837 less than in '73, and 70,800 less than in '72. The export of Pig Iron has not exceeded 16,137 tons, being a decrease of 11,030 as compared with the preceding year, and of 33,000 compared with '72. We exported 26,000 tons Sheet Iron, an increase of 796 tons over '73, and of 2000 over '72. Of wrought iron we exported 198,800 tons, against 17,506, and 101,650 in '73 and '72. Of iron rails we shipped 11,066 tons, against 9565 in '73. We imported 774,780 tons of iron ore, against 739,500 in '73, and of Pig Iron 161,438, against 148,438 in '73. Dealings in iron are pretty much at a standstill in Belgium. Coal.—Approaching the spring season, as we do, the demand diminishes, and our companies content themselves with extracting just enough to supply the moderate current demand and fill old contracts. Their prospects are the reverse of encouraging.

GERMANY.

(Borserhalle.)

HAMBURG, Feb. 12, 1875.—Metals.—There has been a slightly improved demand for consumption observable, in the German metal markets in general, while on the other hand speculation has remained dormant. Copper.—Chilean charters being moderate, and an Indian demand for Calcutta and Bombay having sprung up in England, a better feeling has pervaded the markets on both sides of the channel. In England the decline has apparently been stopped for the present. We are steady here on the basis of 115 marks Lake Superior. Stettin is steady too, at 90 to 105 for Chili, Swedish and English. Tin.—The weakness in England as well as in Holland causes consumers not to anticipate requirements, and we are steady at 106 to 108 for Straits, English and Banca. Lead.—There is less anxiety manifested on the part of holders to rid themselves of the as yet moderate stocks. We quote firm, English 23 1/2 to 24 marks, German 24 to 25 1/2, and Spanish 25 to 26 1/2. Stettin is well supported at 26 1/2 Spanish and 27 Tarnowitz. Spelter.—Lacks activity at the high figures asked. We quote Silesian on the spot and to arrive from 24 to 24 1/2 marks. Bremen has, in the meantime, not wavered from its comparatively high figure of 23 1/2.

HOLLAND.

(Kock & Vierboom.)

ROTTERDAM, Feb. 9, 1875.—Tin.—Banca "spot" from 56-10 guilders at first declined to 55 1/2, and for delivery from the March sale, finally recovered to 55 1/2 while Billiton afloat per steamer "Conrad" was done at 58. Feb. 13.—Since writing the foregoing, Banca sold at 55 1/2, 55 and 54 1/2 on the spot, and 55 March sale futures; Billiton afloat per steamer at 53, and on the spot at 53 1/2, 53 1/2 and 53.

CHINA.

(Arnold, Korbey & Co.)

CANTON, Jan. 6, 1875.—Lead.—In this article there is but little doing, and prices have a drooping tendency. Stocks of L. B. are small, but holders in view of heavy prospective receipts are willing sellers at \$7.50 to \$7.75 per cwt. W. B. and German in large supply, and difficult to move at the reduced values. Tin Plates are quite unsaleable. Tin is quiet, and quoted 25c. per pwt. lower. Quicksilver.—The non-appearance of supplies expected by the last French mail has imparted a somewhat stronger tone to the market, and a fairly large business has been done at \$2.15 per pwt. Stocks on hand are small, and not readily obtainable at our day's quotations. We quote Lead \$7.30 to \$7.70; Tin Plates from \$7.70 to \$8.10 per box; Tin from \$23.50 to \$25.00 per pwt.; and Quicksilver (Spanish), \$2.15 to \$2.16, and California \$2.17 to \$2.18 per pwt. Exchange on New York, five months' sight, 50 per cent. discount.

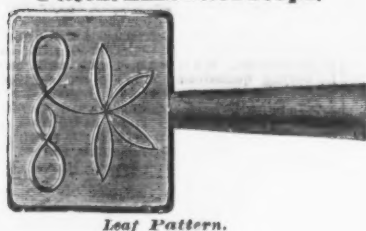
EAST INDIES.

(Dunmiller & Co.)

BATAVIA (Java), Jan. 7, 1875.—Tin.—Billiton There were sold at auction on the 14th ultimo, 202 piculs at an average of 59 7/8 guilders per picul, or equal, at an exchange of 11 1/2 guilders the pound sterling, to £28.7 per ton, free on board, insurance included, but without freight or commission in iron. A lot of Swedish iron, shortly expected to arrive, has been sold at 16 guilders, to arrive, on credit. English is very quiet. Copper Sheathing is in less demand. Coal continues neglected. The sale of the cargo of Australian, per Marie Yenni, is reported at 30 guilders; that per Ker Almee and Retriever has found buyers at 21, all cash, delivered from alongside, but to be weighed on shore. Exchange on London, 6 months' sight, 11 1/2 guilders per £.

H. D. SMITH & CO., PLANTSVILLE, CONN.

Patent Embossed Steps.



Leaf Pattern.

King Bolt Yokes.

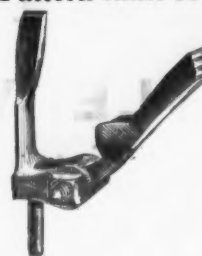


Established 1850.

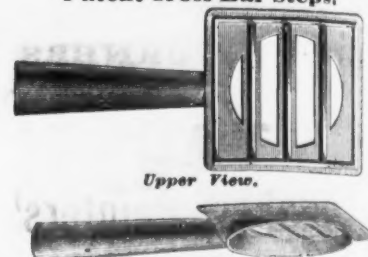
No. 6 Fifth Wheels.



1871 Pattern Shaft Couplings.



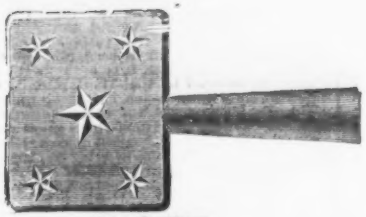
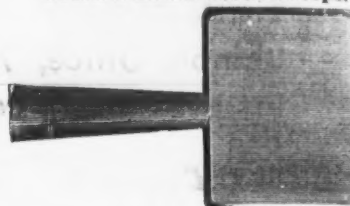
Patent Cross Bar Steps.



Upper View.

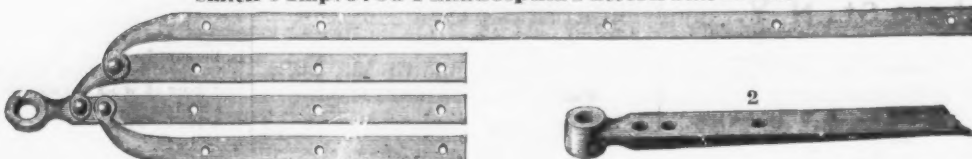
Lower View.

Solid Plain Pattern Steps.



Star Pattern.

Smith's Improved Philadelphia Pattern Slat Irons.



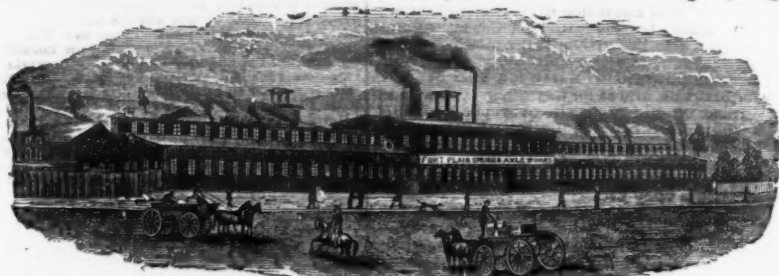
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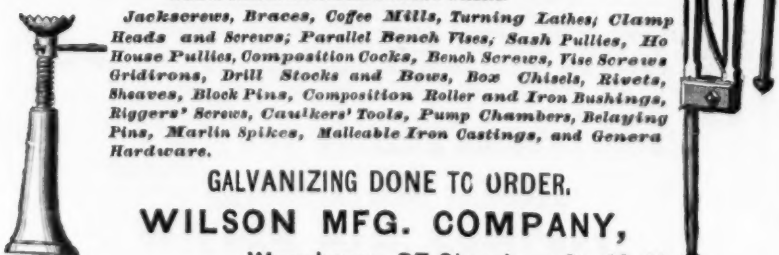
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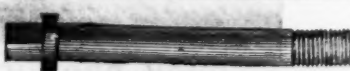
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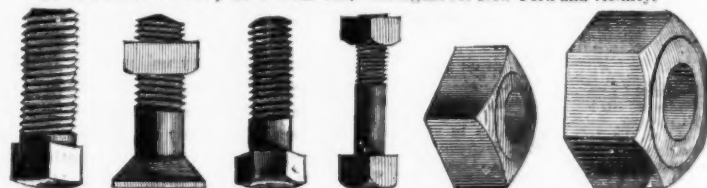
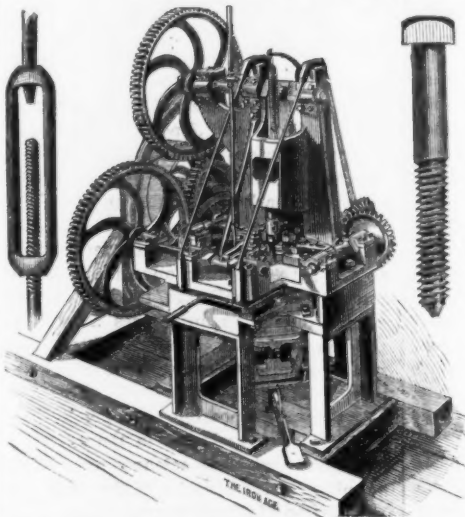
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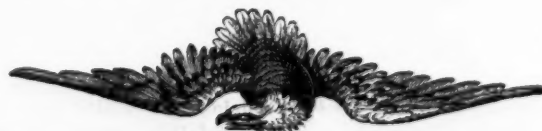
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The Iron Age.

New York, Thursday, March 4, 1875.

DAVID WILLIAMS - Publisher and Proprietor.

JAMES C. BAYLES - Editor.

JOHN S. KING - Business Manager.

New York, January 2, 1875.
Until the 1st instant the postage on newspapers was paid by subscribers at the office where the paper was received, the yearly rates on the different editions of *The Iron Age* being as follows: Weekly, 40 cents; Semi-Monthly, 40 cents; Monthly, 24 cents. Under the provisions of the new postal law, which went into effect on the 1st instant, prepayment at the office of mailing is required, at the rate of two cents per pound for the Weekly, and three cents per pound for the Semi-Monthly and Monthly, which will make the postage as follows on the different editions: Weekly, 50 cents; Semi-Monthly, 30 cents; Monthly, 15 cents.

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Rapid Transit.

The reason we have had so much talk and so little accomplishment in the matter of "rapid transit" in this city, is because we have begun at the wrong end of the problem, and attempted to solve it by working backwards. Ambitious inventors have elaborated very pretty schemes of elevated and underground railways, and have sought to induce capitalists to buy the charters granted them at prices which would have paid many times over for the services of a corps of engineers who would have devised better systems. For this reason nothing has ever come out of the dozen or twenty special charters granted to the incorporators of imaginary companies. As the rule, the merchants and property owners of New York, from whom the large capital needed to build a steam passenger railroad through this city must be obtained, are very careful in

making large investments. They must have entire confidence in the plan proposed, in the honesty and intelligence of the persons to whom its execution will be entrusted, and in the prospect of large enough earnings to pay interest on the capital invested. No plan for which a special charter has yet been secured has fulfilled these conditions, hence none of them have ever had the remotest chance of being carried into execution.

At last, however, the problem has been attacked in the right way, and if we do not have a steam railroad connecting the lower part of the city with Westchester in a reasonable time, it will be because those whom we have elected to govern us do not want us to have it. Several of our largest capitalists and property owners, recognizing the importance of quick transit within our rapidly extending city limits, have petitioned the mayor to ask, on behalf of the people of New York, that the Legislature enact a general law authorizing the building of steam railroads in cities. This law shall provide that the mayors and city councils shall appoint boards of commissioners to survey and decide upon routes, and when this is done the right to follow such routes, with all needful franchises and privileges, shall be sold at public auction to the highest responsible bidder. If such a law is enacted and a route decided upon in this city, the petitioners pledge themselves to bid for it when offered for sale, and to place themselves under forfeiture and surety that the road shall be built and operated without delay. This is "talking business." The petitioners are gentlemen of high character and well known responsibility, who have never before taken the initiative in this movement for the reason that they would never bring themselves to the dirty work of lobbying a special bill through the legislature by the corrupt means which it has hitherto been necessary to employ. Fortunately, a period has been put to such legislation by the new constitution. Rapid transit can only be secured under a general law applicable to every city of the State, and to such a law as that proposed no possible objection can be urged. We hope the mayor will take the petitioners at their word, and show that he has an interest in the true welfare of the city by using such influence as he can command to secure the passage of the law asked for. This done, and a route selected, we may expect that the gentlemen who have signed the petition will come forward and promptly discharge the obligation they have voluntarily assumed. A work thus undertaken would at once command public confidence, the requisite capital could be secured without difficulty, and we should have "rapid transit"—a blessing we cannot hope to secure in any other way yet suggested.

Chinese Cheap Labor at Home.

Why should not China become, in the near future, a great producer of iron for export? The question is an interesting one, which may be answered sooner than we had expected. It has long been known that China has a wealth of undeveloped coal and iron which must some day be utilized, and now that a beginning has been made in iron manufacture, the development of that industry may perhaps be more rapid than seemed probable a few years ago. A correspondent of the London *Times* reports the arrival of a Mr. Henderson, who has come to England with a commission from the authorities of certain provinces of China to procure the necessary machinery and plant for mining coal and iron ores and manufacturing iron; also, to engage competent persons to superintend the mining and smelting operations. The object of this undertaking is to supply the Chinese market with iron cheaper than it can be imported from England. The *Times* says:

The field which has been selected for commencing operations upon in the first instance is situated at Lung Chang, near Tientsin, in the county of Tientsin, in the southern part of the province of Chihli, and bordering on the province of Honan. It would have been impossible to select any locality richer in coal, ironstone and limestone, or better placed with regard to facility of access. The field is situated on a plateau bordering on and about three hundred feet above the great plain of Chihli, and distant about twenty-five miles from some small rivers, down which the produce of the mines and iron works will be conveyed to Tientsin. To complete the chain of communication, it is intended to construct a rail tramway from the mines to one of the rivers in question. It is proposed, in the first instance, to meet the requirements of the national armaments; but, as soon as circumstances will permit, manufactured iron of all descriptions will be produced.

There is much in this little bit of intelligence to set the people of other countries to thinking. Until very lately it has been difficult for us to realize that a nation of whose arts and industries we know so little possessed capacities for acquiring a mastery of the modern arts which would make them formidable competitors in the manufacture of anything of general utility. While admitting the ingenuity and industry of the Chinese people, and their wonderful powers of adaptation and imitation,

most "outside barbarians" have thought of the Chinese artisans in connection with gongs, fire crackers, curious concentric ivory balls, grotesque crockery ware, absurd tea caddies, and the like. It was only when the phantom of "Chinese cheap labor" gave rise to conflicting hopes and fears among all classes in this country, that we began seriously to consider what the Chinese were good for. The threatened tidal wave of Mongolian immigration never broke upon our Pacific shore, and probably never will, for the Chinese are a people who do not readily expatriate themselves; but during and since the cheap labor scare we have learned that a Chinaman is useful for almost any work he may choose to undertake. Great expectations of unlimited industrial expansion and unprecedentedly cheap production, were based by sanguine statisticians upon the promise of his coming to this country: what is to hinder him from realizing these expectations for himself and in his own country? The patient, skillful and, withal, cheap labor which awaits more diversified and useful employment in China and Japan is a potentiality of cheap production which must not be left out of account in estimating the probable future of the world's trade. To this must be added the varied natural resources of those countries, including a supply of fuel of excellent quality, a soil which may be made to produce all the agricultural staples, a climate as good as our own and in many respects better; and it becomes evident at once that Chinese and Japanese nations have as yet contributed little to the world's production of useful commodities in proportion to their capacity. It only needs the directing intelligence of Europeans and Americans to organize a vast industrial system in China and Japan which would make those countries the producers of manufactured articles in countless variety for every market of the world. The modernizing of Chinese and Japanese civilization is progressing with remarkable rapidity; the popular opposition to the introduction of railways, telegraphs, machinery, foreign manufactures and Western ideas, born of a conservatism resulting from long non-intercourse with other nations, is giving way more easily than was at first supposed possible; the progress already made by foreigners in the introduction of their arts and sciences rests upon the substantial foundation of the favor and appreciation of the intelligent classes; and as progress begets progress, we may expect to see marked changes in both countries during the next ten years. One of these will doubtless be the establishment of manufacturing factories by foreigners for the fabrication of articles for export. If the Chinese can make iron why should they not shape and fashion it into any form which may render it useful at home or abroad; if they can manufacture fire arms in arsenals with native labor, why should they not make cutlery and hardware of all kinds for home consumption and for export? We doubt if production can be carried on as cheaply in any other countries of the world, and wherever good labor and abundant materials of excellent quality can be had cheapest, there will capital find its way for investment in manufacturing operations.

With all these facts in mind, we think it safe to venture a prediction that China and Japan have a great industrial future. This presents the old problem in a new and vastly more startling aspect. The Chinese immigrant to this country is no longer an apparition to be feared by trade unions and striking mechanics, who are striving by every means in their power to make labor the one commodity which determines its own value on an artificial basis, independent of the natural laws which govern all exchanges, whether between individuals or between nations; but the Chinese artisan at home, utilizing under intelligent direction the hitherto undeveloped resources of his country, and manufacturing for export so cheaply that he is sure of a market anywhere, may give the familiar line—"We are ruled by Chinese cheap labor," a new and, as yet, unsuspected meaning.

The Pennsylvania Railroad.

The annual report of the Pennsylvania Railroad Company, just given to the public, makes a very interesting showing. The earnings for 1874, as compared with 1873, are given as follows:

	1874.	1873.
From general freight.....	\$2,381,050.38	\$2,343,677.55
From passengers, first-class.....	61,339.80	61,339.80
From passengers, emigrant.....	75,359.98	75,359.98
From express matter.....	76,696.38	76,696.38
From mails.....	\$35,322.64	\$35,322.64
From miscellaneous.....	\$19,570.00	\$19,570.00
Total net decrease, as above.....	\$2,343,677.55	\$2,343,677.55
The expenses in 1874, compared with those of 1873, show as follows:		
	1874.	1873.
For conducting transportation.....	\$485,092.32	\$485,092.32
For motive power.....	688,178.31	688,178.31
For maintenance of cars.....	699,642.77	699,642.77
For maintenance of road.....	387,439.14	387,439.14
For general expenses.....	\$25,504.51	\$25,504.51
Total net decrease, as above.....	\$2,343,677.55	\$2,343,677.55

During the year the company carried on its main line 9,088,103 passengers, and 9,118,419 tons of freight. The cost of operating the road is calculated at 58.49 per cent. of the gross earnings, and the net surplus for the year, after paying dividends, taxes, etc., is \$3,100,493.49. The New Jersey lines controlled by the company earned \$8,700,969.36, and cost 69.26 per cent. of this amount to operate. The loss to the company on the New Jersey lines, after paying the guaranteed interest dividend, was \$31,161. Deducting this from the net earnings of the main line, we have a net profit to the Pennsylvania Company of \$3,168,332.49 as the surplus for the year. Of the floating debt \$2,688,450 has been paid during the year, and it is proposed to pay the remaining \$4,000,000 during 1875 by the sale of securities held to control certain roads, which are no longer important to the company.

The report announces that the policy of the Pennsylvania management in future will be directed to the development of the system now owned or controlled, and that no new lines will be acquired or leased, with the exception of a few unimportant local roads, which may be found useful as feeders to the main line. We think this is a wise determination. The indefinite expansion of a corporation of this kind may be attended with serious danger to the best interests of the stockholders and the public. The system of roads now controlled by the Pennsylvania Railroad Company is as vast as any one board of directors can keep well in hand, and while Mr. Scott no doubt has a wonderful talent for expansion and organization, it might be difficult to fill his place with one who could properly control the management of so great a system.

We print in another column the full text of the new tax and tariff bill as it passed the Senate on Tuesday night. The first effect of the new law upon the prices of imported manufactures of iron and metals will be seen by consulting our trade reports and quotations of prices current.

The Hudson River Tunnel.

While our people are watching with interest the progress of the undertaking which has for its object the tunnel of the English Channel, but little interest has been felt or expressed in a work of much more importance to us, the construction of a tunnel under the Hudson River, between New York and Jersey City. This tunnel, upon which work has already been begun at the foot of Fifteenth street, Jersey City, is the most important engineering work which has been undertaken in this neighborhood for many years. The purpose is to construct a tunnel from Jersey Avenue, Jersey City, under Fifteenth street to the river, then under the river bed to the foot of Christopher street, New York, and thence to its projected eastern terminus at Broadway and Tenth street. The work is to be done under the supervision of two companies—one in New York with a capital of \$7,000,000, and another in New Jersey with a capital of \$3,000,000, making a total capital of \$10,000,000. The New York corporations, among whom are William Martin, George F. Seward, C. Goddard, A. C. Foster, William J. Osborne, C. H. Dearing, G. H. Clowes, A. A. Selover, Albert B. Gibbs, J. Tucker, Ira A. Kipp, George A. Thayer, A. A. Roberts, and others, filed their articles of association in the office of the Secretary of State, of New York, under the general railroad law, on the 22d day of May, 1873. Four days later the articles of association of the New Jersey corporations were filed with the Secretary of State of New Jersey. Like the New York corporations, they too are acting by virtue of authority conferred by the general railroad law, passed by the New Jersey Legislature early in 1873. The companies thus organized acquired from the city of Jersey City permission to sink a shaft at the foot of Fifteenth street, Jersey City, and in October, 1874, commenced operations about 100 feet from the edge of the water. The shaft, about 30 feet in diameter, is to be 65 feet deep. The laborers had worked upon the bore for 23 days, and had dug to a depth of about 20 feet, when further progress of the work was stopped by an injunction issued by Chancellor Runyon, at the instance of the Delaware, Lackawanna and Western Railroad, who claimed the ground upon which operations had been commenced. The Chancellor's order precludes the company from going on with the work until they shall have made compensation to the owners of lands they propose to traverse. The company claim to have been ready and willing at all times to remunerate the railroad company for the lands they had taken, and Mr. Henry S. White, counsel for the tunnel company, made application soon afterward for the appointment of Commissioners to condemn and assess the values of lands taken by the company. This application, made before Judge Dupue in the Essex Circuit, was resisted by Jacob Vanatta, Esq., on behalf of the railroad company, on the ground that the tunnel company is not a railroad company, and had no right to organize under the general railroad law. Mr. White contended that the tunnel was to be constructed for the purpose of establishing railroad communication with New York. Mr. Vanatta urged in reply that the railroad was a mere incident, and that the main object of the company was to construct a tunnel. Judge Dupue appointed the Commissioners, but deemed the question so close a one that he immediately certiorari'd the question to the Supreme Court for decision. In order to dispose of whatever questions may arise under the general railroad law, Mr. White has procured the introduction into the Legislature of a bill amending the general railroad law so as to allow a railroad constructed in a tunnel beneath the surface of the ground to pass under the land of other railroad corporations,

provided that the road so constructed underneath the surface, shall be fifteen feet below the surface, and in no way interfere with any necessary use of such land, by the corporation owning the same, for the purposes of their franchises. The bill also provides for the proper condemnation of the land necessary for the construction of such underground railroad. The proposed amendment, while introduced at the instance of the Hudson River Tunnel Company, will accrue to the benefit of any company who may hereafter see fit to embark in a similar undertaking. So far from abridging or making any exception to the general operation of the law, it enlarges its scope. The bill has been favorably reported by the committee, and is on the clerk's desk in the lower house awaiting a second reading.

The tunnel upon which work has been thus commenced is to be 24 feet high and 26 feet wide, inside measurement. At the water's edge, on the Jersey shore, it is to be about 35 feet below the surface, and at the point where it will strike the New York city shore line it will be 45 feet below. When it shall have been finished it is to be fitted up with double tracks, and trains will be run over them at regular intervals for the accommodation of passengers. Flat cars are to be provided for the transportation of horses and wagons and other vehicles, and much of the freight from the great railway companies who own the shore front will be transported through it. Its walls are to be of brick, and will be three feet in thickness.

When the river shall have been reached, it is proposed to carry it on to completion by the construction of what, in tunnel architecture, are known as "locks"—air-tight passages, in which the pressure of the air will be sufficient to resist the pressure from the outside, until the walls shall have been completed. The excavation is to be accomplished through the agency of an air-tight tube. The pressure of the air is expected to remove all the earth taken from the tunnel with the rapidity with which fifteen men could shovel it into cars, and it is to be carried, by the same natural agent, through a tube to the surface, thus saving the expense of laborers and of transportation upon cars.

The New Tax and Tariff Bill.

The following is the full text of the new Tax and Tariff bill as it passes the Senate on Tuesday night:

Be it enacted, etc. That from and after the date of the passage of this act, there shall be levied and collected on all distilled spirits hereafter produced in the United States a tax of ninety cents on each proof gallon or wine gallon when below proof, to be paid by the distiller, owner or person having possession thereof, before removal from the distillery bonded warehouse; and so much of section 3251 of the Revised Statutes of the United States as is inconsistent herewith is hereby repealed.

Sec. 2. That section 3398 of the Revised Statutes be and the same is hereby amended by striking out the words "twenty cents a pound," and inserting in lieu thereof the words "twenty-four cents a pound." Provided, That the increase of tax herein provided, for shall not apply to tobacco on which the tax under existing law shall have been paid, when this act takes effect. That section 3394 of the Revised Statutes of the United States be amended by striking out "five" wherever it occurs, in that section, and inserting "six" and by striking out "fifty" and inserting "seventy-five." Provided further, That whenever it shall be shown by testimony under oath, to the satisfaction of the Secretary of the Treasury, that any person liable to pay the increased tax upon tobacco, cigars or cigarettes by this act imposed had, prior to the 10th day of February, 1875, made a contract for the future delivery of such tobacco, cigars or cigarettes, at a fixed price, which contract was in writing prior to that date, such tobacco, cigars or cigarettes may be delivered to the contracting party entitled thereto under special permit from the Commissioners of Internal Revenue provided therefor, without previous payment of such additional tax; but the said additional tax shall be a lien thereon, and shall be paid by and collected from the purchaser under such contract before the sale or removal thereof by him, and when demanded by the collector of internal revenue for the district to which the same shall be removed for delivery to the purchaser; and any sale or removal by such purchasers, prior to the payment of such tax, shall be null and void, and the tobacco, cigars or cigarettes so sold or removed to all the penalties and forfeitures of law provided in the case of tobacco manufacturers so selling or removing tobacco to avoid the payment of tax.

Sec. 3. That on all molasses (not including tank-bottoms, sirup of sugar, sugar cane juice, melado, or concentrated melado) and on sugars, according to the Dutch standard in color, imported from foreign countries, there shall be levied collected and paid, in addition to the duties now imposed in schedule G, section 254 of the Revised Statutes, an amount equal to 35 per centum of said duties as levied upon the several grades therein designated. Provided, That concentrated melado or concrete shall hereafter be classed as sugar, dutiable according to color by the Dutch standard, and melado shall be known and defined as an article made in the process of sugar making, being the cane juice boiled down to the sugar point, and containing all the sugar and molasses resulting from the boiling process without any process of purging or clarification; and any and all products of the sugar cane imported in bags, mats, baskets or other than tight packages, shall be considered sugar, and dutiable as sugar; and, provided further, that of the drawback on refined sugar exported, allowed by section 3019 of the Revised Statutes of the United States, only one per centum of the amount shall be retained by the United States.

Sec. 4. That so much of section two thousand five hundred and three of the Revised Statutes as provides that only ninety per centum of the several duties and rates of duty imposed on certain articles therein enumerated by section two thousand five hundred and four shall be levied, collected and paid, and the same is hereby repealed; and the several duties and rates of duty prescribed in said section, two thousand five hundred and four, shall be and remain as by that section levied without abatement of ten per centum as provided in section two thousand five hundred and three.

Sec. 5. That the increase of duties provided by this act shall not apply to any goods, wares or merchandise actually on shipboard, and bound to the United States, on or before the tenth day of February, 1875, nor on any such goods, wares or merchandise on deposit in warehouses or public stores at the date of the passage of this act.

Sec. 6. That nothing contained in the act entitled "An Act to Amend Existing Customs and Internal Revenue Laws, and for other purposes," approved February 8, 1875, shall be construed to impose any duty on bolting cloths, heretofore admitted free of duty; nor to require the use of a stamp upon the receipt in the receipt book of a savings bank or institution for savings having no capital stock and doing no other business than receiving deposits to be loaned or invested for the sole benefit of the parties making such deposits, without profit or compensation to the association or company, when money is paid to a depositor on his pass book.

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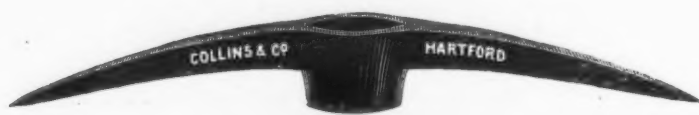
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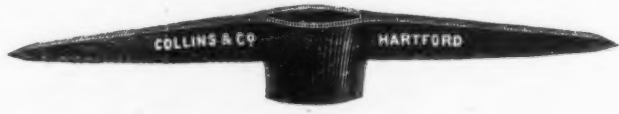
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Pattern No. 484, Black Finish.



Pattern No. 485, Black Finish.



Pattern No. 488, Black Finish.



Pattern No. 487, Black Finish.



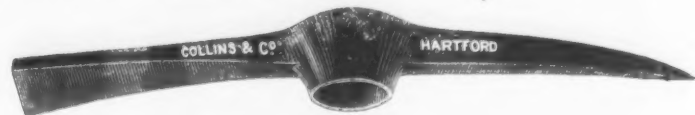
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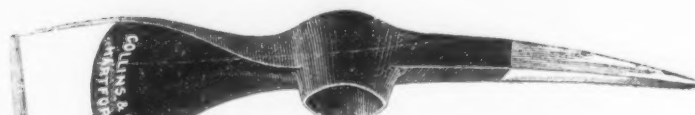
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The Law of Patents.

The following digest of decisions rendered by the courts in patent cases during the past year will be found of interest to a very large class of our readers:

ABANDONED EXPERIMENTS.

If an alleged prior invention was only an experiment, never perfected, but abandoned, it cannot prejudice a patent for a similar improvement obtained by a subsequent inventor.

[Brown vs. Guild, 392; Brown vs. Selby et al., 392.]

Machines which have been abandoned after being experimented upon do not prejudice a subsequent patent for a successful machine, however closely they resemble each other.

[Birdsell vs. McDonald et al., 682; Birdsell vs. Ashland Machine Co. et al., 982.]

A patent will not be set aside upon the mere testimony of a single witness that many years ago he saw a machine like the one described; it must be regarded at most as an abandoned experiment, no second machine having been known.

[La Baw et al. vs. Hawkins et al., 724.]

ABANDONMENT.

A patent issued June 7, 1864, upon an application filed April 7, 1864, sustained upon evidence of the applicant's poverty and efforts, although he had filed a previous application for the same invention May 14, 1852, and it had been twice rejected in 1855, and by the Commissioner in 1856, and a rehearing had been refused in 1859, and although the invention had gone into public use in 1860.

[The Goodyear Dental Vulcanite Co. et al. vs. Root, 154.]

An invention held to have been abandoned to the public when the author, after having reduced it to perfection and actual practice, took no further measures with it for nine years and suffered the molds to be lost, and meanwhile others, independently of him, reduced it to practice and introduced it extensively into market. It is not necessary that the latter should obtain a patent. It is enough if they have reduced the invention to practice, and it has gone into use.

[The Consolidated Fruit Jar Co. vs. Wright, 327.]

The first inventor does not lose his right in such case in consequence of the mere lapse of time, but because the circumstances indicate an intention of abandonment, and because the rights of others have intervened.

[The Consolidated Fruit Jar Co. vs. Wright, 327.]

A patentee cannot be charged with having abandoned his invention because his solicitors, without his knowledge, neglected to file his application in the Patent Office for more than two years after it had been sworn to, and was in all respects complete.

[Birdsell vs. McDonald et al.; Birdsell vs. Ashland Machine Co. et al., 682.]

An invention will not be held forfeited be-

cause it was used for experimental purposes, in good faith, for more than two years before applying for a patent. The objection is not one to be regarded with favor; but, if clearly established, it is fatal.

[Birdsell vs. McDonald et al.; Birdsell vs. Ashland Machine Co. et al., 682.]

Delay in filing an application is no ground for charging the inventor with abandonment if he was residing in the insurrectionary States during the war.

[Knox et al. vs. Lowrey et al., 802.]

Imperfect and crude descriptions of an invention imparted to others are no evidence of an intention to abandon it. Neither is the use of an invention for the purposes of experiment, though made in public from necessity. Neither does such use debar from a patent, although it takes place more than two years before the application.

[The Locomotive Engine Safety Truck Co. vs. the Pennsylvania R. R. Co., 927.]

When two years have elapsed after the allowance of an application without the payment of the final fee, it cannot be renewed under section 32 of the act of 1870, but is absolutely abandoned under the 45th section, and the commissioner has no power to revive it.

[Robert McCully, 153.]

A patent is void if more than two years before the application for it was filed the patentee had sold the patented articles for the double purpose of realizing the proceeds and of seeing if they would sell, and others had them in actual use.

[The Consolidated Fruit Jar Co. vs. Wright, 327.]

ARTICLES OF MANUFACTURE.

In order to sustain a patent for a manufacture it is essential that invention or discovery must have been exercised in producing it. It is not enough that it is a new article of commerce.

[The Milligan & Higgins Glue Co. vs. Upton, 837.]

ASSIGNEES.

Where the assignees of the inventor filed and completed their application for a reissue before July 30, 1870, it was held that their oath to it was sufficient without that of the inventor.

[The National Spring Co. vs. The Union Car Spring Manufacturing Co., 234.]

Under the act of March 3, 1871, the oath of the assignees is sufficient upon an application for the reissue of a patent originally issued before July 8, 1870; the oath of the inventor is required only when the original patent issued after that date.

[The National Spring Co. vs. The Union Car Spring Manufacturing Co., 234.]

CLAIMS.

Where a patentee disclaims so many elements of his invention as to leave no room for the exercise of invention in forming the combination which he claims, it is of no avail for him to show that he was really the first inventor of all or any of the parts thereof.

[The Consolidated Fruit Jar Co. vs. Wright, 327.]

The summary of the patentee's claim, usually annexed to the specification, admits that all that is not included is old, and it is a sufficient compliance with the law requiring the new to be distinguished from the old.

[Brown vs. Hatch, 392; Brown vs. Selby, 392.]

COMBINATIONS.

A combination is legitimate when all the elements co-operate in producing a result, and are necessary to it, though their several functions are not performed simultaneously; if performed in immediate succession it is sufficient.

[Birdsell vs. McDonald et al., 682; Birdsell vs. Ashland Machine Co. et al., 682.]

If any one uses all the elements of a patented combination except one, and, instead of that, employs what was known at the date of the patent to be a proper substitute for the omitted element, he is liable for an infringement of the patent. But he is not liable if he uses any other substitute, or even an old one, which performs a new function.

A combination of four elements is not the same invention as a combination of three of them without the fourth.

[Gill vs. Wells, administratrix, 881.]

The direct radiation of heat into baking chambers, and the use of bread holders swinging from the arms of rotating reels being both well known, it seems that a patent for a combination of the two cannot be sustained.

[Ball vs. Withington et al.; Ball vs. Bailie, 933.]

CONSTRUCTION OF CLAIMS.

A claim for "mounting the attendant upon a seed planting machine in such a position that he can see the marks made on the ground, and operate the dropping of the seed accordingly" is void as a claim for a result irrespective of the means of accomplishing it. But if qualified by the words "substantially as herein set forth," and the means are described in the specification; it is no longer open to the objection.

[Brown vs. Hatch, 392; Brown vs. Selby et al., 392.]

In a patent for a spark arrester and consumer, the first claim was for "the combination of the compound blast pipe with a spark or return flue communicating with the fire chamber, provided with a bell shaped mouth, which is located above, adjacent to and coincident with, the exit aperture of the blast pipe, &c.; and it was held that the invention consisted in the combination so operating that the sparks were driven into and through the return flue in a continuous current without resting.

Such a claim is not void for want of novelty in the invention, although similar apparatus had been known before, in which the current driving the sparks was not continuous, but interrupted.

A cone and deflector, constituting, together, a bell shaped deflector, turning the sparks into an annular chamber which surrounds the blast

pipe, and terminates in two tubes passing through the boiler into the fire box, is equivalent of the bell mouthed return flue described in the patent.

An apparatus embracing such an equivalent is an infringement of the patent, although the flow from the blast pipe is re-enforced by a current of air from openings in front of the smoke arch, if the sparks are driven by a continuous action of the compound blast.

[Hike vs. The Providence & Worcester R. R. Co. et al., 575.]

A patent in which the invention is specified to be "one or more swinging bread holders suspended from the arms or end plates of a rotating reel, in combination with a furnace, so arranged and connected that the products of combustion pass into or through the chamber in which the bread holders move," must be interpreted to claim the direct radiation of heat from the furnace into the bread chamber.

Where the application upon which an original patent was granted relied upon heating the external walls of the bread chamber, or circulating through its currents of hot air, and contained no reference to such a direct radiation of heat into the bread chamber, a reissue embracing such a claim as the above is void.

[Ball vs. Withington et al., 933; Ball vs. Bailie, 933.]

DAMAGES.

No damages can be recovered upon a bill in chancery brought before July 8, 1870, for the infringement of a patent, except the actual profits made by the defendants from the use of the plaintiff's patent.

If the plaintiff's patent covers all that is meritorious in what constitutes the infringement, the plaintiff should recover all the profits the defendants have made out of it; but if they used other improvements, which increased the value of the production and enhanced their profits, a corresponding reduction should be made in their favor.

It belongs to the defendants to show the value of such improvements; if they furnish no such proof no deduction will be made.

They will be allowed to deduct the royalty they paid for the use of a patented improvement which they used, unless the plaintiff shows that they paid more than it was worth.

It would seem, also, that they should be allowed the cost of introducing any improvement if they furnished evidence of what the cost was.

Reasonable salaries paid by the defendants to their officers who superintended the work should be deducted from the profits charged to them.

They should not be charged for the profits upon work for which they could not collect their pay.

They are not to be charged with interest upon the damages until the date of the final decree.

The defendants, having acted in good faith, and having reason to suppose that they were

protected by a patent, are not to be mulcted with punitive damages, but are simply to restore what they have made by the use of the plaintiff's property.

The defendants in a suit for infringing can have no allowance made them on the ground that they might have used other improvements with as much profit as they made out of the plaintiff's invention.

If patentees have been accustomed to grant licenses for the use of their invention, the royalty they have required will be a criterion for estimating the damages they should recover in a suit for infringement.

If a territorial assignee has agreed with the owners of a patent that he would license others, for a stipulated royalty, to use the invention where he was prevented from it by municipal regulations, he is not to be restricted by the amount of such royalty in estimating the damages he should recover, from infringers, if through their management the regulations were made which prevented his doing the work.

Where a territorial assignee had agreed with the owners of a patent that he would license others for a stipulated royalty to lay down the pavement embraced in the patent in any place where he was prevented from laying it himself, either by judicial decisions or because the law required the work to be let to the highest bidder: Held, that his being prevented by a law giving the adjacent property owners the right to select the pavement did not come within the terms of the agreement, and that the stipulated royalty formed no criterion for estimating the damages to be recovered for laying the plaintiff's pavement in the place.

Where it does not appear from the master's report that there was evidence before him to sustain a charge which he has allowed, it will be stricken out.

[The American Nicholson Pavement Co. vs. Elizabeth City et al., 764.]

(To be continued.)

The Puddlers' Strike.

PITTSBURGH, PENN.,—Mar. 1.—Two thousand puddlers, boilers, and helpers held a meeting in the City Hall to-day with closed doors, excluding representatives of the press. It has transpired that this meeting was for the purpose of considering the question of the importation of colored puddlers and the matter of continuing the lock out. It was resolved to make preparations to prevent the bringing of colored puddlers to this city, and to continue the lock out until \$6 per day is paid. Several mill owners are making arrangements to bring colored puddlers from Richmond and other points, and trouble is anticipated.

At a later hour a meeting of the puddlers, and citizens generally, was held at the same place, and resolutions were passed asking Congress to appropriate money to improve the Ohio River and guarantee the interest on the Northern and Southern Pacific bonds. The meeting was held in the interest of the Texas Pacific Railroad.

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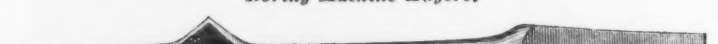
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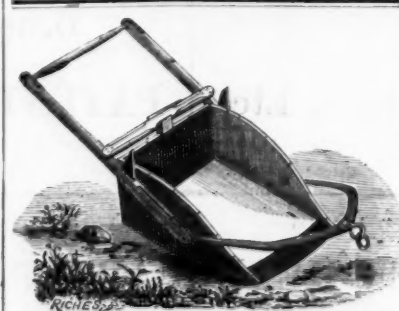
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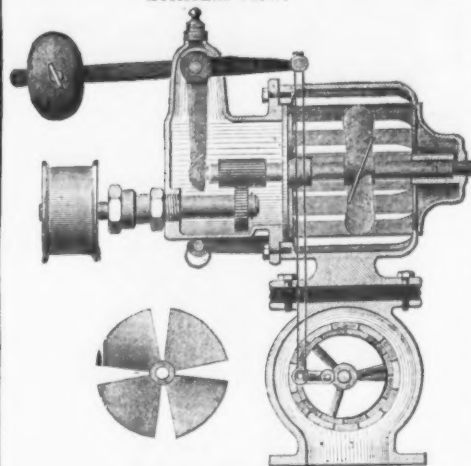
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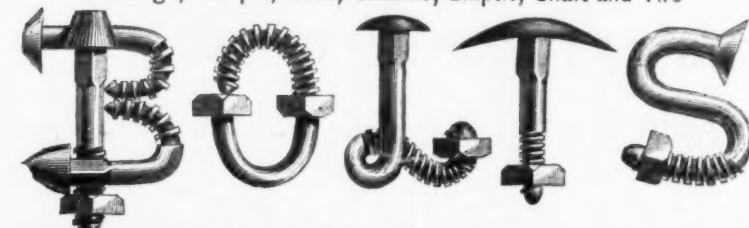
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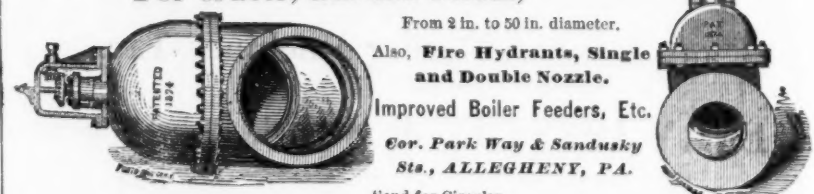
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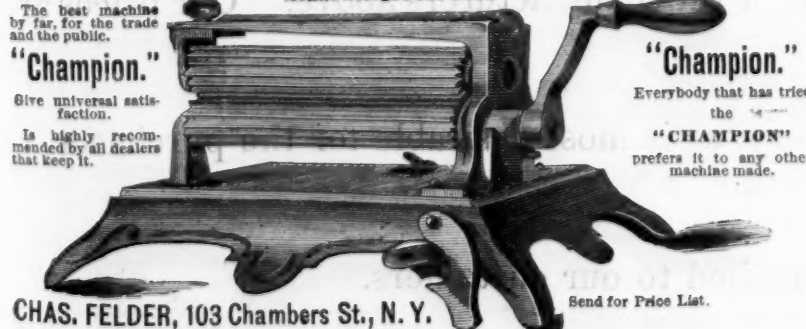
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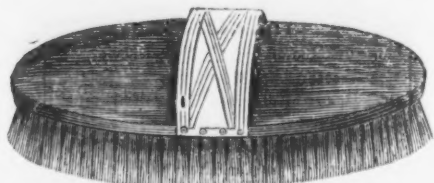
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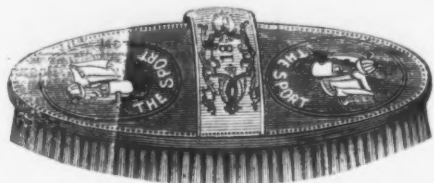
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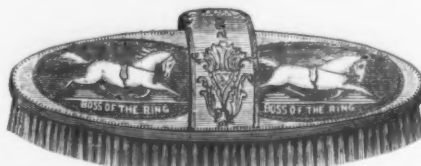
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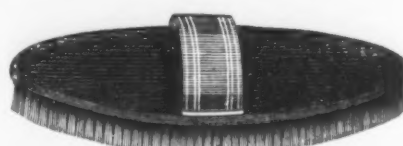
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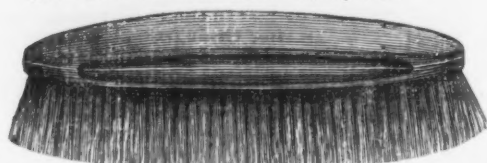
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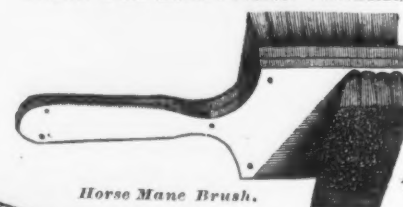
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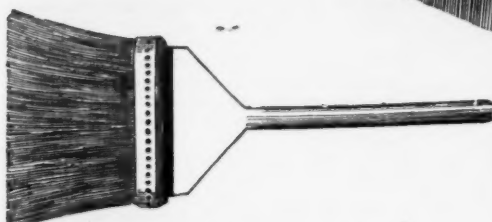
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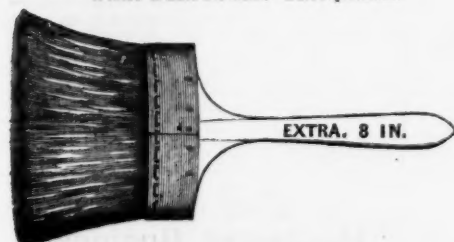
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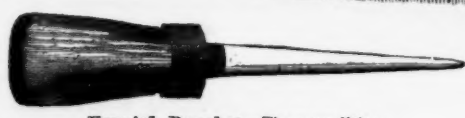
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White Wash Brush.—Three qualities.



Kalsomine Brushes.—Three qualities.



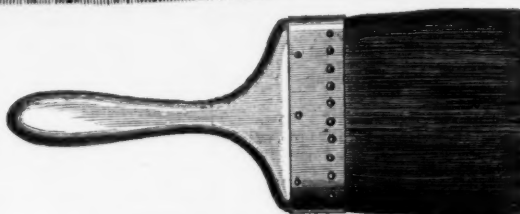
Varnish Brushes.—Three qualities.



Flat Varnish.—Two qualities.



Paint Brushes.—Five qualities.



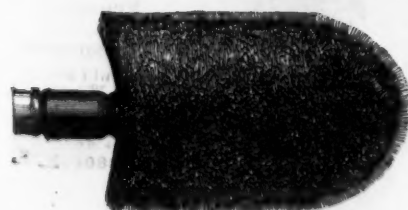
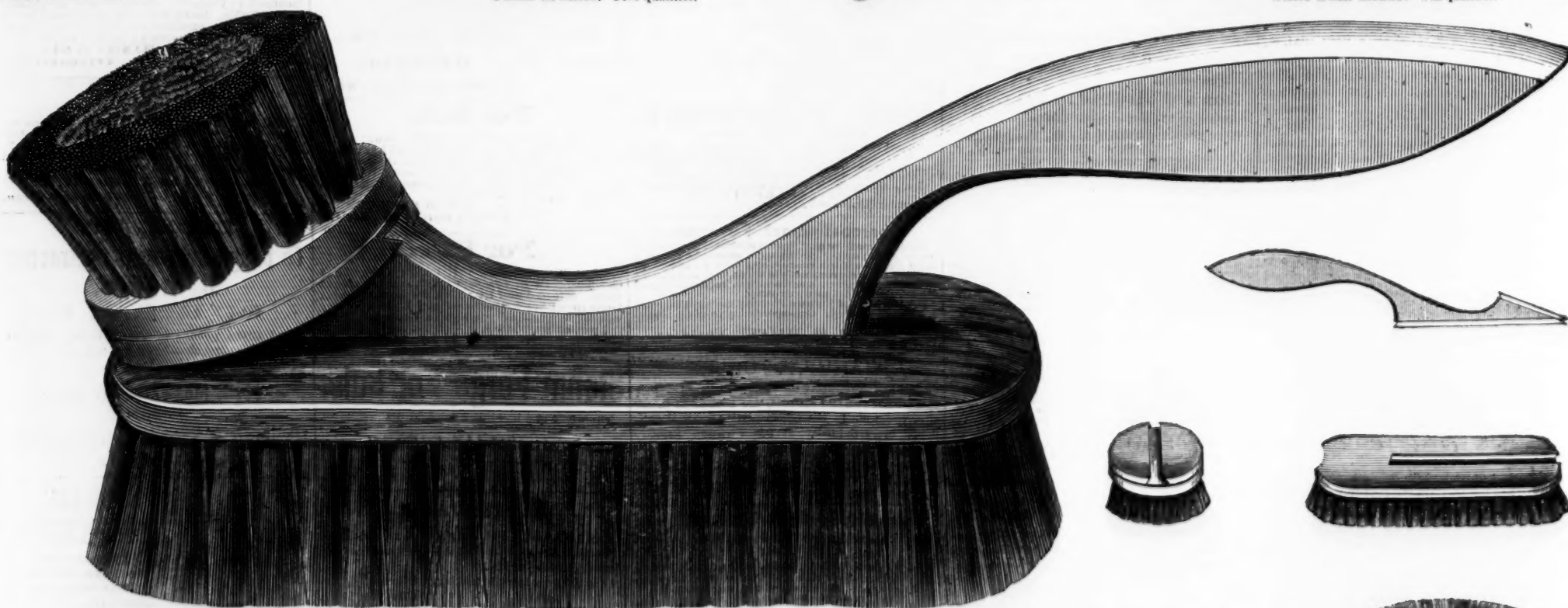
Wall Brushes.—Five



Painters' Duster.



White Wash Heads.—Ten qualities.



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TRY IT! It is the best selling Shoe Brush made. 22 kinds. Catalogue and Prices will be furnished upon application.



scription of railroad accessories—neither buffers, springs, tires nor axles being in anything like well sustained request. The directors of the Midland Railway Company are, nevertheless, asking for tenders for the supply of 3000 pairs of carriage and wagon wheels and axles, such tenders to be sent in not later than February 16th, inst.

Speaking of wagons, furnishes me with a reminder that the whole of the local wagon companies are presenting very favorable reports to their shareholders. In addition to those to which I made allusion in my last week's communication, I notice that the Sheffield Wagon Company, Limited, has purchased 231 wagons during the half-year, making the stock 4136 wagons. A profit of £2343 14/11 has been made during that period, out of which—after working expenses have been paid—it is proposed to pay dividends of 15 per share on the first issue, 11 on the second issue, 8 on the third issue, 6 on the fifth issue, 5 on the sixth issue, and 2 on the seventh issue, all free of income tax.

At the half yearly meeting of the British Wagon Company, Limited, Rotherham, a dividend of 10 per cent., with 1 1/4 per cent. bonus, was agreed to.

Owing to the prevalent depression in the iron and steel trades, the Sheepsbridge Iron and Coal Company has reduced the wages of its workmen, the rolling and tire mill men to the extent of 10 per cent., and the blast furnace men and puddlers 5 per cent. The men have accepted the revised scale without any dispute.

There is little change in the cast steel trade, matters being on the whole very little better than they were prior to Christmas, although there had, in the interval, been a promise of an improved state of affairs. America, however, is not furnishing as many orders as it had been believed would be the case, consequently many of the local steel firms are not by any means fully employed.

Files and the general run of saws are not in very free request, owing to the poverty of the United States and Russia demands, but it may be stated that Canada, Sweden, Norway, and other timber-growing countries, are pretty good and steady customers for large sized circulars and frame saws.

The engineering works are not actively engaged, but at several establishments a fair amount of work is being done in the shape of replacement and repairs of old machinery and fittings.

Edge tools proper are in steadily good demand for New Zealand, the Cape, India, the West Indies and Australia, and are likely to sell freely for some months forward.

The shareholders of Joseph Rodgers & Sons (Limited) met at their offices last week and declared a dividend of 10 per cent., making, with the interim dividend of 5 per cent. paid at midsummer last, a division of 15 per cent. for the year. They also added between £4000 and £5000 to the reserve fund. The chairman, Mr. Newbold, told the shareholders that they had much reason to be well satisfied with the year's trading, taking into consideration the disturbed and sluggish state of trade all over the world, and had good prospects for the current year. I think I have before stated that there are only about 35 or 36 shareholders in this concern.

Some of the manufacturers and exporters report a little better business in best cutlery, and a few of them are sending heavy lots of common goods off to the Eastern, African, Levantine, and West Indian markets. Australia and Canada are manifesting a clearly stronger desire to trade with us. At Liverpool, on Friday, 115,000 E. I. buffalo horns were offered for sale. There was fair competition, and about 94,000 sold—105% oz. to 25% oz., at 22 1/2 to 26 and 57% oz. at 41 1/2, the latter being a good price, while light horns were generally 1 to 2, easier.

SOUTH STAFFORDSHIRE AND BIRMINGHAM. There is very little alteration to record in the general quotations for Staffordshire finished iron, but it may be said that owing to the easier tendency of best coal, bars and other iron are not unlikely to come down a little. A fairly good medium bar is, in fact, now obtainable at £8 17/6, and good plates at £12 to £12 10. A little more business is being done in strips and hoops for baling purposes on United States account, via Liverpool. There is, also, a fairly well sustained demand for sheets, which are quoted at £12 for good singles, and from that down to £10 10 for the same size for galvanizing use. Several descriptions of hardware are selling rather more freely than they have lately done, and appear likely to be in brisker request as the season advances. Iron washers are reduced about 12 1/2 per cent., and nuts and bolts are also much easier. Engineers' bolts over 3 in. are 2 to 3 per gross lower, coach and wagon bolts 2 to 4 per cwt. down; coach screws (pointed), 2 to 3 per cwt., and small sizes 3d. per gross off; machine made nuts are 2 to 4 easier, hand made 2 to 3, with small sizes 3d. per gross. Other kinds of nuts, bolts, set screws, bolt ends, machine made rivets, gasfitters' stocks and dies, screw plates, taps, pipe wrenches, cutters, spanners (Clyburn's), and other similar goods are all reduced by 5 to 12 1/2 per cent., net.

SOUTH WALES. I cannot add much to what I have reported of the state of trade in this district under the heading which has reference, above, to the great strike there.

THE METAL MARKETS have been quiet during the week, and values have remained similar to those last recorded. Messrs. Von Daelen & North report: "Copper.—The last small charters from Chili, and the coal question, have caused a better inquiry for bars; business has been done at £83 10, and £83 15 for G. O. B., and £84 for Lot in Swansea, and G. O. B. to arrive. Wallaroo held at £93; Burra, £91. In English a good many cheap second-hand parcels of tough and select having been cleared, prices are decidedly firmer. Tin dull and rather lower. The large arrivals of Straits and Australian make buyers hesitate. A moderate business has been done in Straits at £92 down to £90 10 for spot, and £90 for arrival. Australian £90. English is rather unsettled. Tin plates, very little passing, prices steady. Lead continues flat at £23. Spelter.—Owing to scarcity of fuel, some of the Swansea smelters are asking more money; no transaction reported in Silesian, nominally £23 10. Quicksilver about £21 10, but buyers few and shy. Antimony £54 1/2. The Mining Journal remarks: "Copper.—The market has become distinctly firmer during the week, and holders have been unwilling to sell except in small quantities, and at full rates. Many, indeed, decline to sell at all, as they look for a considerable advance. The chief support which the market has received has been the continuance of the Indian demand for manufactured. So long as this goes steadily on, even should there be no increase to it, prices of all descriptions of copper will probably remain very firm, and with a general demand will certainly advance. Sir Charles Forbes & Co.'s circular, dated Bombay, Jan. 18th last, states that 'both sheets and sheathing have been in improved request at an advance of 8 annas per cwt., stocks being light, and the up-country demand having strengthened. No transactions, however, have transpired from first hands. Yellow metal continues in good inquiry, and prices have advanced 8 annas per cwt. all round, and although only one sale has been reported from first hands, a good bazaar business has taken place.' Spelter.—Ordinary Silesian is quoted about £23 10, but the market lacks animation. Zinc.—London rolled has been sold at £28.

Lead.—The market is a shade firmer. Good soft English pig is quoted £23 to £23 5, and soft Spanish £22 to £22 10. Quicksilver.—The last transaction reported is £21 10. Tin.—The tin market has lacked animation throughout the week. Transactions have been limited, and prices have not been firmly maintained. At the same time, there has been no important drop in values, and it is questionable whether holders would submit to more than trifling concessions. At the beginning of the week Straits tin changed hands at £92 cash, and today the quotation is £90 10. Australian realizes £90 cash. Tin plates.—The market is quiet. The large sales for America have not afforded that support to the market which was expected. The general demand is limited, and trifling concessions will probably be submitted to to secure a good order.

Messrs. French & Smith say: "Metals continue unaltered. Iron is steady. Copper is slightly improved. Chili bars have realized £83 15 and £84. English is quiet. Tin is weaker, forward sales having been made at £90. Straits spot is quoted £91. Australian, £90. Tin plates steady. Lead steady. Spelter unchanged. Quicksilver, £21 10 per bottle."

Messrs. Vivian, Younger & Bond report: "Copper firm and rather more active; 200 tons Chili bars done at £83 10 to £84 5, cash, and arrival for G. O. B. and named brands."

Latest Liverpool prices are these:

Iron: f. o. b. in Liverpool, per ton.	£	s.	d.	£	s.	d.
Merchant bar.....	8	15	0	9	0	0
Merchant bar, in Wales.....	8	5	0	8	10	0
Staffordshire.....	9	5	0	11	15	0
Sheep.....	12	15	0	13	15	0
Sheet.....	12	10	0	13	10	0
Nail rod.....	10	0	0	10	10	0
Bar, best crown.....	9	5	0	9	10	0
Boiler plates.....	12	0	0	13	5	0

Tin plates: f. o. b. in Liverpool, per box.

Coke, I. C.....	1	8	0	1	10	0
<i>Copper: Delivered in Liverpool, per ton.</i>						
Bolt and Sheathing.....	£98	@	£100			
Tile.....	90	@	91			
Tough cake.....	91	@	92			
Best selected...	92	@	94			

Copper: Delivered in Liverpool, per ton.

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206 & 208 Franklin St., N. Y.,
Importers and Dealers in
IRON and STEEL

[For Foreign Metal Reports see page 11.]

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25 ".....	\$25-00	4 ".....	\$5-50	15 ".....	\$15-00
35 ".....	\$30-00	6 ".....	\$7-00		

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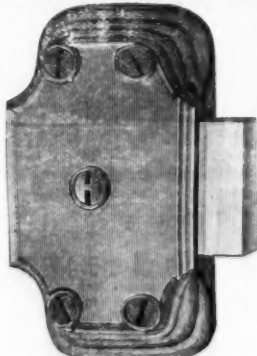
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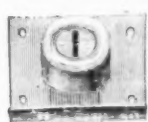
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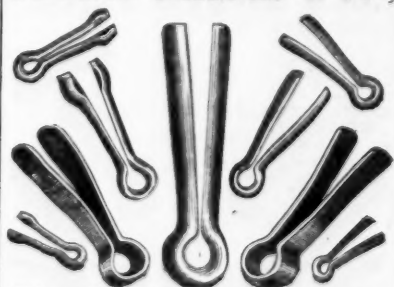
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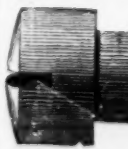
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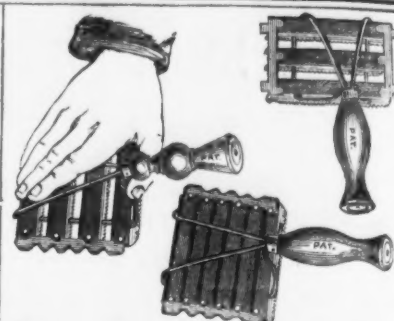
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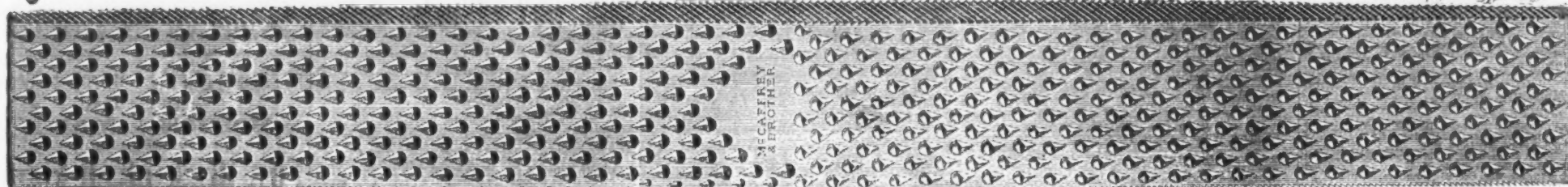
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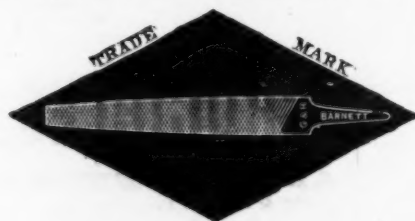
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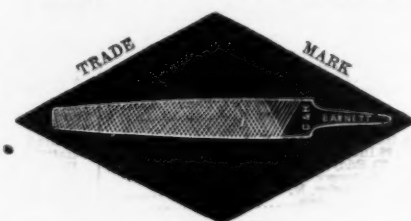
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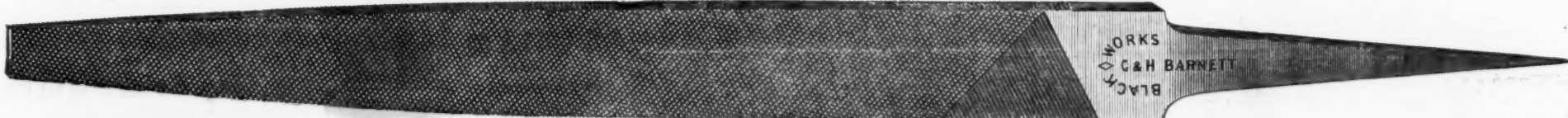
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Foreign Preparations for the Centennial.

The following communication from Philadelphia, bearing date of February 20th. will be read with interest:

Those who knew of the interest taken in World's Fairs in Europe, and were aware that these vast assemblages of the people and the products of all nations had come to be looked upon there as powerful agencies in advancing civilization, never doubted that the international features of the Centennial Exhibition would be successful. It will not surprise them, but it will both astonish and gratify those who, from want of information, were skeptical upon this point, to learn that the question now troubling Director-General Goshorn and his assistants, is not how to persuade foreign countries to send their wares hither, but how to find space for such as are freely offered. Every day brings fresh evidence that the foreign departments will be crowded, and that there will not be room for all the articles which exhibitors will want to display. The commissioners of several countries have already requested more space than has been assigned them on the preliminary chart of the main building. On Saturday a letter was received from the Commissioners of the Netherlands—a country which was put down for 7776 square feet of floor space conjointly with Denmark—objecting to this partnership arrangement, and saying that the Netherlands would want the whole amount of room allowed for the two countries. Although the Dutch are not a manufacturing people, they will bring many goods, because included in their department will be the products and fabrics of their rich East India colonies. A letter from one of the Spanish Commissioners, which came the same day, says that Spain will fill twice the space occupied by her at the Vienna Exposition. She made there a display that was considered very creditable, in view of her civil wars and unstable government, but Cuba and her other West Indian possessions were scarcely represented at all. On account of the close commercial relations of the United States with the Spanish-American colonies they will, it is believed, send more articles to the Exhibition than the mother country. The greatest display made by any European country will, no doubt, be that of the German empire. The German government is sufficiently paternal in its character to organize

its department thoroughly and make sure that not a single creditable industry of the German people is omitted. Beside, it is exceedingly ambitious of enlarging German commerce, and introducing German manufactures everywhere, and understands the great value of a world's fair as an instrument to forward these objects. At Vienna the German government, finding the space allotted it in the exhibition buildings insufficient, erected at its own expense three immense structures for the display of its educational methods, mining, industry, toys, leather goods, musical instruments, and other articles crowded out of their department in the industrial palace.

Following close after Germany, in the extent of her display, will be the Empire of Austria, which, under the liberal policy of the Andrassy ministry, is making great efforts to extend her commercial relations and introduce her manufactures abroad. The advice and aid of Baron Schwarz-Senborn, General Director of the Vienna Exhibition, and now the Minister of Austria to this country, will make this department of great interest and value. All the countries' dainty articles for ornament and use which the skillful Vienna artisans make of leather, ivory, amber, meerschaum and mother-of-pearl will be displayed, together with the cloths of Moravia, the exquisite glassware of Bohemia and the iron products of Styria and Carinthia. Hungary will probably insist upon a separate department, although the commission, in their diagram, put her in the Austrian department. The Hungarians are very sensitive about the recognition of their recently regained nationality. At Vienna they had their own commission, and walled their department off from that of Austria with their tri-colored flags of red, white and green. It may be, however, that as the two countries present a united front in their relations with other nations, under the name of the Austro-Hungarian Empire, there will be no separation of their exhibits at the Centennial. Hungary is an agricultural country, rich in corn and wine, and in the partially developed mineral stores of the Carpathian Mountains, but her manufactures are in their infancy, having scarcely had time to gain a foothold since the abandonment of the repressive policy in Austria. The prosperous capital of Budapest, whose growth during the past eight years has surpassed that of many cities in the

Western States, will send many articles, and the kindly feeling of most Hungarians toward the United States, on account of the reception given Kossuth in this country, will have its effect in bringing to Philadelphia the best manufactures of a people having so little trade intercourse with us.

From the Scandinavian countries interesting exhibits are fully assured. Norway has asked not to be confounded with Sweden, and wants a separate department. Sweden will show her excellent iron, her furs, the matches she makes for all Europe, and specimens of the porcelain and silk industries lately introduced within her borders. Norway will send the products of her mines and fisheries; and Denmark promises, beside a good display of the manufactures of Copenhagen, collections illustrating the manners, customs, and industries of Iceland and Greenland.

France will crowd the space assigned her, and her department will no doubt be the most orderly and systematically arranged of any, and at the same time the most brilliant. Its abundance of articles of display, jewelry, bronzes, silks, velvets, and laces, will secure for it the latter distinction, while the French bureau system that works like a clock amid political turmoil and changing governments, will produce an exhibit which for completeness and perfect classification will be a lesson to unmethodical Americans.

Russia, there is reason to fear, will not be represented, unless by the voluntary contributions of her people unaided by their government. The Czar, it is asserted, does not forget the alleged lack of courtesy shown by President Grant to the Grand Duke Alexis when the latter visited Washington, and is disposed to punish the managers of the Centennial for the sins of the President.

Italy has not yet appointed a commission, but the Centennial authorities are informed that this will soon be done, and that the collections of mosaics, cameos, corals, statuary, Venetian glass, Genoese silk and other beautiful articles which were the wonder of all nations at the Vienna and Paris fairs, will be displayed in Philadelphia. Switzerland will show her exquisite laces, her watches and mathematical instruments, and the curious wood carvings for which she is famous. Exhibits from Greece

and Portugal are expected, though, I believe, not yet definitely promised.

There has never been much question as to Great Britain's hearty participation in the Centennial. Col. Forney's visit to London appears to have stimulated increased interest among the leading English manufacturers. All the principal British colonies will make separate exhibits, and have been awarded liberal space. Mr. J. Perroult, Secretary of the Canadian Commission, was here on Saturday last, and gave an interesting account of the preparations making in the Dominion for a full display of the products of that region. The Dominion government has appropriated \$250,000 to pay the expenses of the Commission. British India, Australia, New Zealand and the Cape of Good Hope will be fully represented. All the South American countries have applied for space, and several have their Commissions already organized. Brazil and Chili will take the lead in the extent of their exhibits; but all will surpass their rather meager contributions to previous World's Fairs. The same may be said of Mexico and the Central American States, while the little Hawaiian Kingdom, whose monarch was lately the nation's guest, will send her tropical agricultural products in great abundance. The managers are not so certain of as full a display from the Oriental countries as is desirable. Egypt and Japan hold out the best prospect. The enlightened ruler of the former country, surrounded as he is by a staff of American officers, will unquestionably give a good deal of attention to the exhibition, and Japan will assuredly be well represented. What will be done by Turkey, Persia, Siam, and China is not yet known. There is talk of sending a special commissioner to all the Eastern nations, beginning with Turkey and ending with Japan, to furnish information and make selections of articles to be sent to the exhibition.

In this brief review of the part foreign countries are likely to take in our American World's Fair, it may be well to add that of the total floor space in the main exhibition building, amounting to 485,000 square feet, the United States will occupy 123,160, and all other nations 340,432 square feet. This allotment leaves 21,408 square feet undisposed of and reserved for future contingencies. The assignment of space to different countries is only provisional, and is therefore not worth publishing at present. No diagram partitioning the space in the machinery, agricultural and horticultural halls has yet been made.

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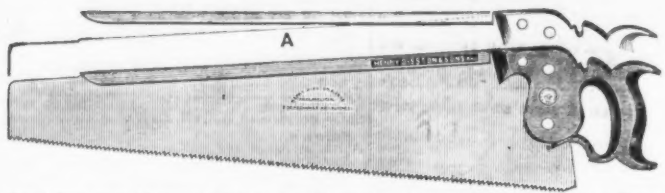
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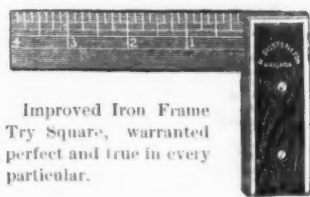
Pork Packers' Saw.



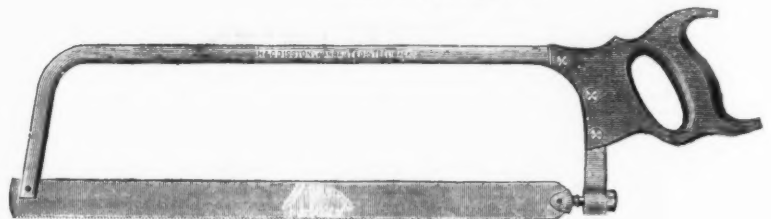
Improved Pruning Saw and Knife,
Patented August 29, 1873.



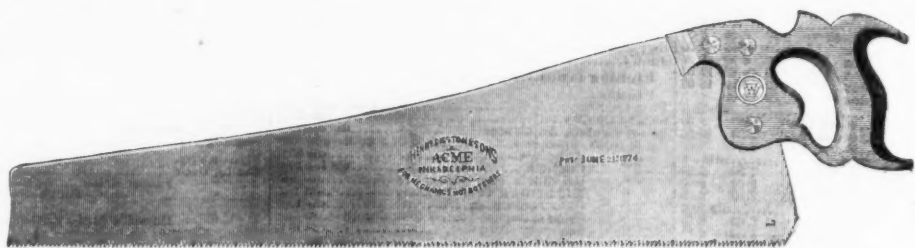
Mitre Box Saw.



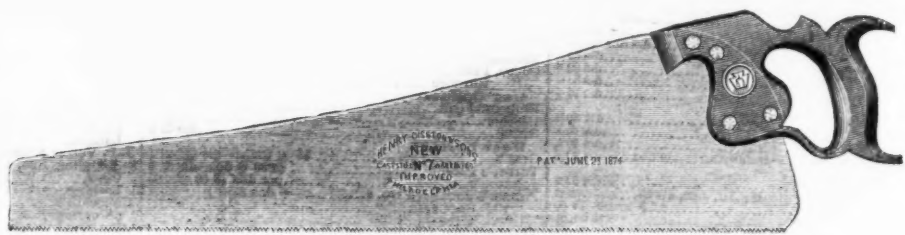
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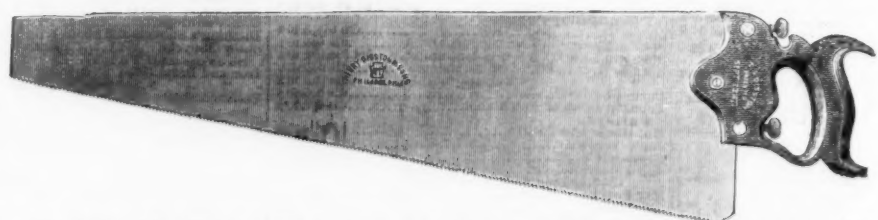
No. 1 Butcher Saw.



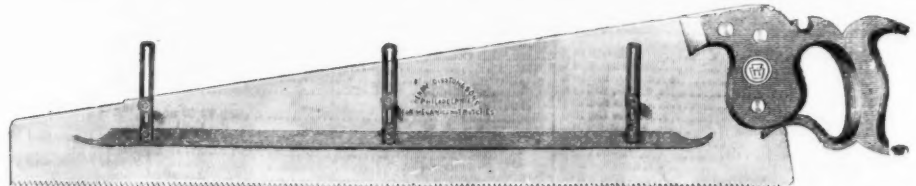
New Patent Skew Back Hand Saw.



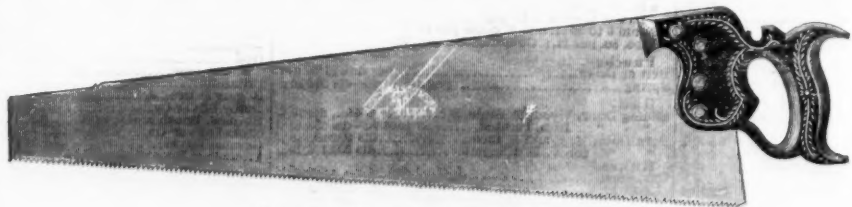
New Patent Skew Back Hand Saw.



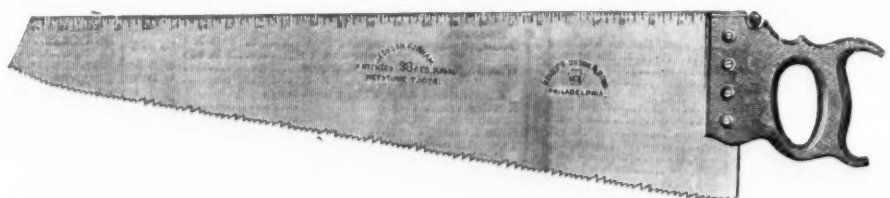
Hand Saw with adjustable handle. The thumb screws in the handle operate on the butt of the saw blade, and can be so adjusted as to give the blade any desired pitch.



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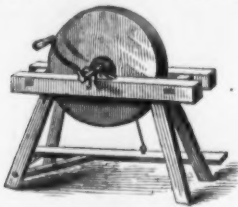


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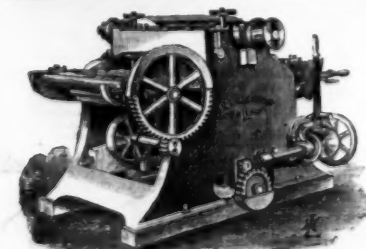


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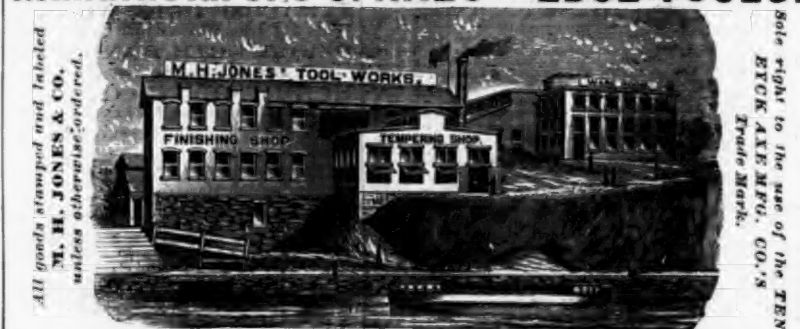
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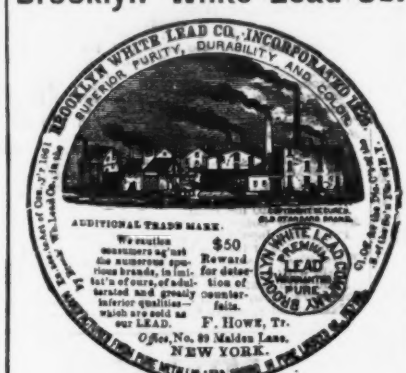


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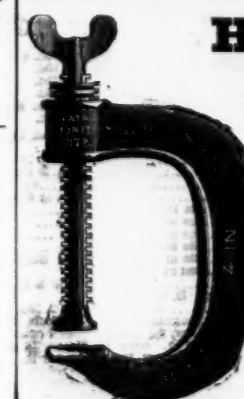
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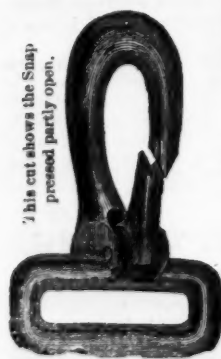
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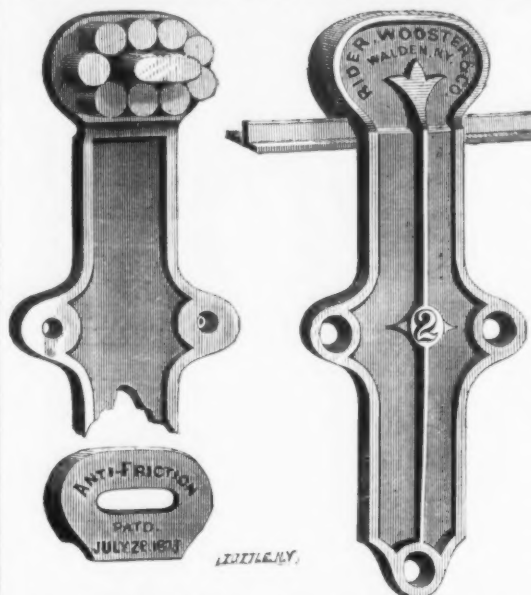
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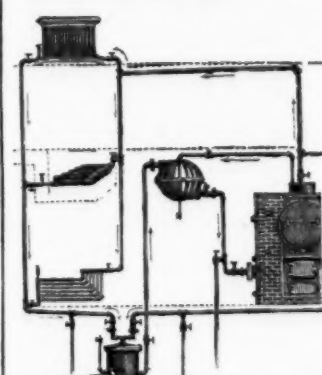
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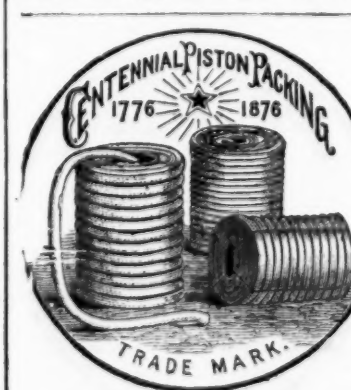
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AUTOMATIC
STEAM TRAP WORKS.**C. A. PROUTY,**

Inventor and Patentee.

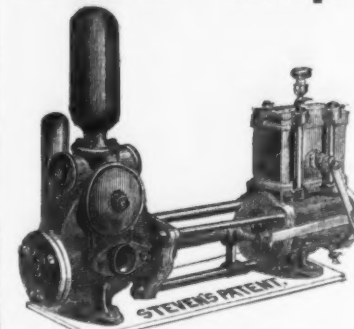
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in operation for two years, is simple in construction and practical in application; there are no
levers, weights, cranks, diaphragms or pistons to get out of order. It is self-operating, thus
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SELF-LUBRICATIVE**Hemp Piston Packing**Locomotives, Steamships, Stationary Engines,
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Manufacturer and Patentee of

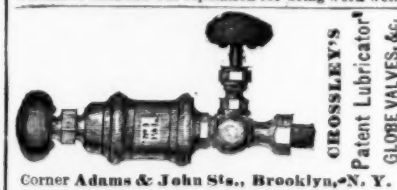
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We aim to maintain our reputation for doing work well.**ROP**
PRESSES**Bennett Hotchkiss and**
N. C. Stiles' Patent.This Drop (which has been illustrated in this jour-
nal of that class in which the Hammer is ruled by a stiff
belt or board passing up between two friction rolls, and
is so well known that we will only describe our improve-
ments. The patents we are working under are those of
BENNETT HOTCHKISS (who in an interference case with
Goulding and Cheney was declared the first inventor)
and N. C. STILES. Our improvements consist:**First**—Of an arrangement of parts that makes it the
most complete Jobbing Hammer, and will take the place,
to a great extent, of all other kinds for forging. In ad-
dition to the upright rod, which is operated by the ham-
mer to open and close the rolls, we place another rod
the lower end of which is secured to the end of a lever
which is operated by the hand or foot, which operation
also opens and closes the rolls at will. The lower end of
this rod has a slot, so that the action of the hammer will
not disturb the hand lever, thereby preventing the hand
being injured, as otherwise would be the case.**Second**—No dog is used on the upright to hold up the
hammer. The belt or board passes up between two
clamps situated under the rolls, so arranged that as the
hammer descends they will freely open of themselves, but
on descending they will close and hold up the hammer.
To let the hammer fall the clamps are opened by pres-
sure upon the foot treadle.**Third**—The board or belt is secured to the hammer by
an elastic connection, which prevents the sudden jar and
destruction of the same. The back roll is made adjust-
able to different thicknesses of board or belt, as also are
the clamps. An adjustable collar on the upright rod al-
lows the operator to obtain any height of blow desired
automatically. If one blow is wanted, press upon the
treadle and remove the pressure as soon as the blow is
given. Keep the foot upon the treadle and the blows
will be repeated until the pressure is removed. If a
blow of less height than the collar is set for is required,
work the hand lever, which will give you any height of
blow desired. The hammer can be held up at any point
below the collar by bringing the hand lever into action
when the hammer is at the desired height, so that the
next blow can be given from a state of rest, of less height
than the collar is set for. This is a feature no other drop
has; that is, the first blow struck can be of less height
than the second or third, and obtained from a state of
rest. A gentle pressure upon the treadle will allow the
hammer to go down slowly, but it will stop and remain
suspended at any point as soon as the pressure is re-
moved.The clamps in holding up the hammer keep the board
from touching either roll and prevents the same from
being worn uneven.

Manufactured only by the

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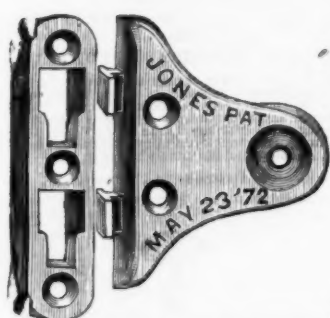
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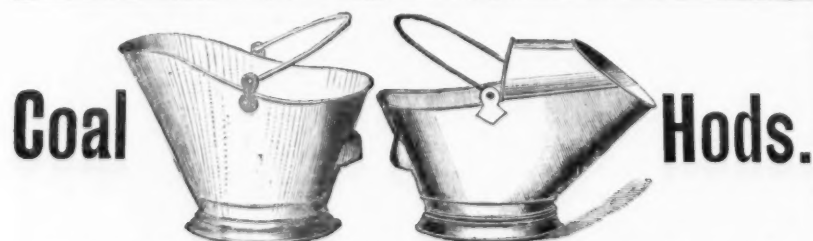
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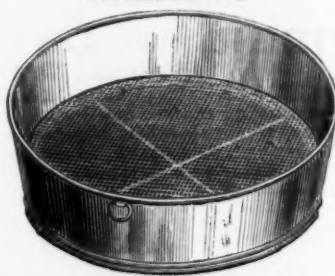
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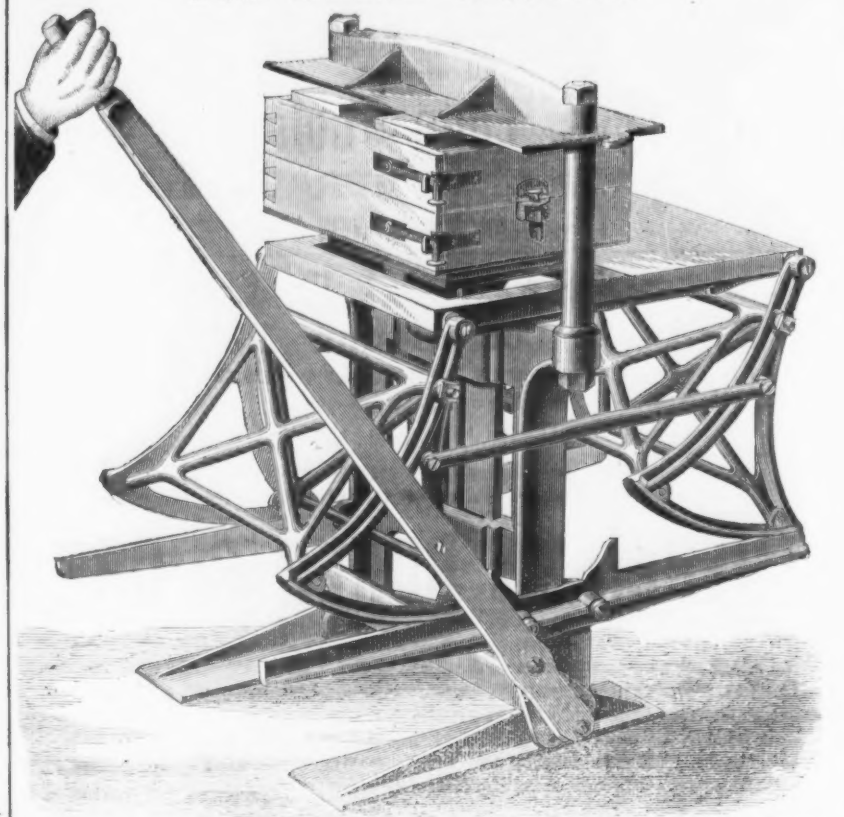
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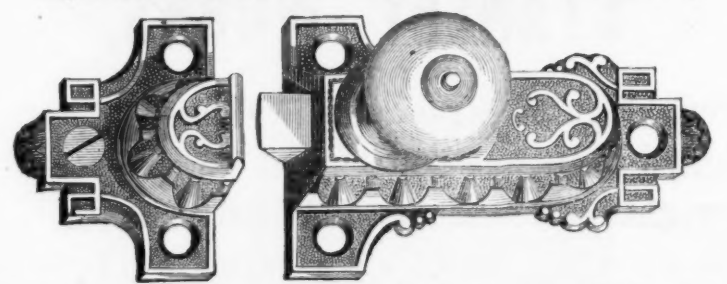
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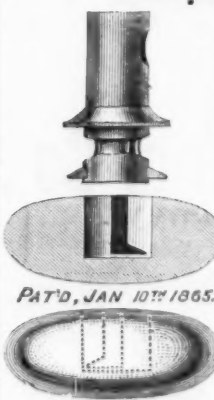
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Boards—Stove, Brooks' Patent.....	12 1/2
Butts.....	12 1/2
Wrought Bar.....	12 1/2
Broad, Loose Joint.....	12 1/2
Table and Back Flaps.....	12 1/2
Wrought Bar, Loose Pin.....	12 1/2
Betting-Rubber.....	12 1/2
Leather, new list, oak tanned.....	12 1/2
Shoes.....	12 1/2
Brick—Bath (one of 2 doz) Best.....	12 1/2
Rutherford.....	12 1/2
Cases—Parlor Coal Hot.....	12 1/2
Chairs.....	12 1/2
Reel, Carpenter's.....	12 1/2
Blue.....	12 1/2
Chicago—Finner Socket.....	12 1/2
Framing Socket.....	12 1/2
Corner Socket Chisels.....	12 1/2
Sticks & Knives.....	12 1/2
Castings—Malleable.....	12 1/2
Elbows.....	12 1/2
Charcoal.....	12 1/2
Russia.....	12 1/2
Files—Malachite Bros.....	12 1/2
Plates—Geneva Hand.....	12 1/2
Freezers Ice Cream—Champion.....	12 1/2
Hammers—Henry W. Kip's.....	12 1/2
Hinges—Window Blind.....	12 1/2
Clark's.....	12 1/2
Shepard's and Standard.....	12 1/2
Wrought Strap and T.....	12 1/2
Hods, Coal—Plain Black and Galvanized.....	12 1/2
Fancy and Helmet.....	12 1/2
Hooks and Staples—Wrought.....	12 1/2
Hooks—Best.....	12 1/2
Hoop and Strap—Wrought.....	12 1/2
Saw Irons.....	12 1/2
Kettles—Brass.....	12 1/2
Expanded.....	12 1/2
Knives, Drawing—Oval No. 1.....	12 1/2
Razor Blade.....	12 1/2
Lancets—Furber's.....	12 1/2
Tunners.....	12 1/2
Machines—Apple Paring, "Turn Table".....	12 1/2
Mills, Coffee—Box and Side, common.....	12 1/2
Box Union and Eagle.....	12 1/2
American.....	12 1/2
Nails—Clout and Finishing.....	12 1/2
Horse, Ausable.....	12 1/2
Clinton.....	12 1/2
Packing—Rubber.....	12 1/2
Case lots.....	12 1/2
Paint—White Lead, U. S. & T.....	12 1/2
Lifters—Iron, Black and Tinned.....	12 1/2
Ropes—Manilla, 1/2 inch and larger.....	12 1/2
Steel, 1/2 inch and larger.....	12 1/2
Jute, all sizes.....	12 1/2
Screws—American Screw Co.....	12 1/2
Flat Head, Iron.....	12 1/2
Spoons, Iron, Tinned.....	12 1/2
Plated Rogers' A No. 1.....	12 1/2
Britannia.....	12 1/2
Squares—Steel and Iron.....	12 1/2
Scales—Buffalo Scale Works.....	12 1/2
Fairbanks.....	12 1/2
Stove Polish.....	12 1/2
Dixons.....	12 1/2
Traps.....	12 1/2
Tacks—Half Weight Am. Iron.....	12 1/2
Vases—Palace Coal.....	12 1/2
Wares—Parallel, Buffalo.....	12 1/2
Wares—French, Tinned and Iron.....	12 1/2
Jampot and Jammed.....	12 1/2
Cast Iron Hollow.....	12 1/2
Tin Plates. —Add for case.....	12 1/2
No. 10.....	12 1/2
No. 12.....	12 1/2
No. 14.....	12 1/2
No. 16.....	12 1/2
No. 18.....	12 1/2
No. 20.....	12 1/2
No. 22.....	12 1/2
No. 24.....	12 1/2
No. 26.....	12 1/2
No. 28.....	12 1/2
No. 30.....	12 1/2
No. 32.....	12 1/2
No. 34.....	12 1/2
No. 36.....	12 1/2
No. 38.....	12 1/2
No. 40.....	12 1/2
No. 42.....	12 1/2
No. 44.....	12 1/2
No. 46.....	12 1/2
No. 48.....	12 1/2
No. 50.....	12 1/2
No. 52.....	12 1/2
No. 54.....	12 1/2
No. 56.....	12 1/2
No. 58.....	12 1/2
No. 60.....	12 1/2
No. 62.....	12 1/2
No. 64.....	12 1/2
No. 66.....	12 1/2
No. 68.....	12 1/2
No. 70.....	12 1/2
No. 72.....	12 1/2
No. 74.....	12 1/2
No. 76.....	12 1/2
No. 78.....	12 1/2
No. 80.....	12 1/2
No. 82.....	12 1/2
No. 84.....	12 1/2
No. 86.....	12 1/2
No. 88.....	12 1/2
No. 90.....	12 1/2
No. 92.....	12 1/2
No. 94.....	12 1/2
No. 96.....	12 1/2
No. 98.....	12 1/2
No. 100.....	12 1/2

Galvanized Iron. —Full bundles.....	12 1/2
Nos. 10 to 20.....	12 1/2
No. 22.....	12 1/2
No. 24.....	12 1/2
No. 26.....	12 1/2
No. 28.....	12 1/2
No. 30.....	12 1/2
No. 32.....	12 1/2
No. 34.....	12 1/2
No. 36.....	12 1/2
No. 38.....	12 1/2
No. 40.....	12 1/2
No. 42.....	12 1/2
No. 44.....	12 1/2
No. 46.....	12 1/2
No. 48.....	12 1/2
No. 50.....	12 1/2
No. 52.....	12 1/2
No. 54.....	12 1/2
No. 56.....	12 1/2
No. 58.....	12 1/2
No. 60.....	12 1/2
No. 62.....	12 1/2
No. 64.....	12 1/2
No. 66.....	12 1/2
No. 68.....	12 1

Steel.

THREE
CLASS PRIZE MEDALS.
CLASSES 1, 2, 22.
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LONDON, 1861

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UNIVERSAL
EXHIBITION OF INDUSTRY
PARIS, 1865.

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Cast Steel Hammers and Sledges. Also, "M. & G." Anvils and Vises.
WARRANTED CAST STEEL, especially adapted for DIES and TURN-
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PUNCHES and all kinds of MACHINISTS' TOOLS.
Celebrated Improved Mild Centre Cast Steel, for Taps, Reamers, and Milling Tools,
warranted not to crack in hardening of any size.
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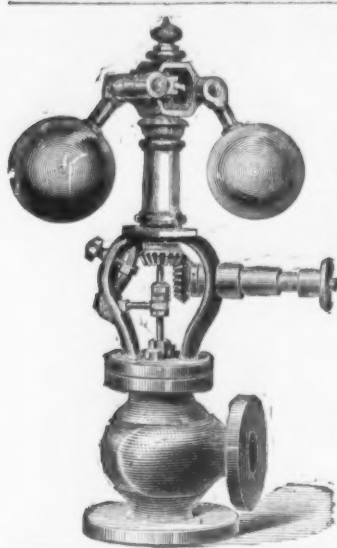
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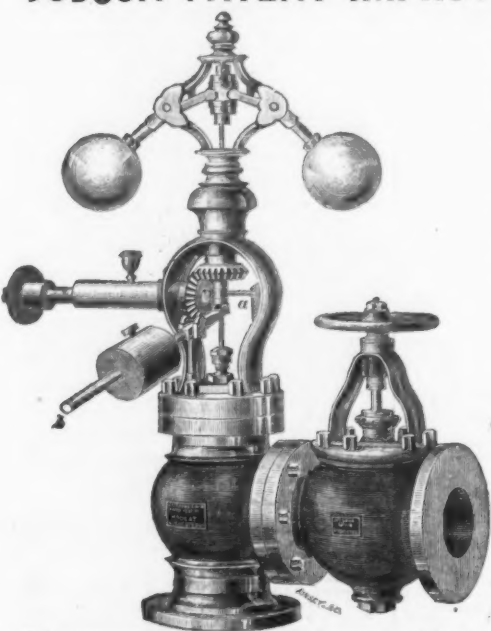
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The Best and Cheapest Watcher of the Watchman made
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Circulars sent free.

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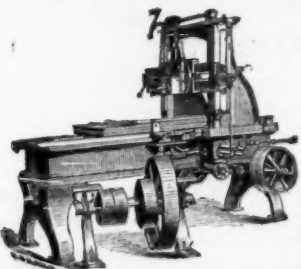
W. Governors are ordered, be particular and say Governor with Stop Valve, or without Stop Valve; and either Black, Finished or Portable, as you may require, and with or without Lever Attachment. For dimensions and other particulars send for Illustrated List.

Capacity of Valve of Diameter of Steam Pipe in inches.	Price, Black.	Price, Bright Finish.	Price, Portable.	Price of Lever Attachment for altering speed.	Price of Stop Valve.
1 1/2	18.00	20.00	17.00
2	20.00	22.00	19.00
2 1/2	24.00	27.00	22.00	2.00	5.25
3	29.00	32.00	27.00	2.25	6.65
3 1/2	34.00	38.00	31.00	2.50	8.00
4	41.00	46.00	38.00	2.75	11.50
4 1/2	47.00	51.00	..	3.00	16.00
5	50.00	55.00	47.00	3.50	17.00
5 1/2	55.00	60.00	..	3.75	19.00
6	62.00	70.00	..	4.00	25.00
6 1/2	71.00	80.00	..	4.50	32.00
7	81.00	92.00	..	5.00	32.00
7 1/2	91.00	103.00	..	5.50	37.00
8	102.00	114.00	..	6.00	42.00
8 1/2	116.00	129.00	..	6.50	48.00
9	134.00	148.00	..	7.00	55.00
9 1/2	160.00	176.00	..	8.00	69.00
10	199.00	219.00	..	9.00	89.00
11	297.00	325.00	..	10.00	..

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Have constantly on hand and making

Drop Hammers

Of recently Improved Construction. Pony Trip Hammers, Blacksmiths' Sheaves, Broaching and Stamping Presses, Iron Shop Cranes, Machinists' Tools, Gun and Sewing Machine Machinery. Make to order Gray and Charcoal Iron Castings of all styles and sizes not exceeding 15 tons weight, (making patterns if desired). Furnish Clamp Pulleys of light patterns, cut gears in a superior manner, &c., &c.

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New Pattern with Important Improvements & Abundant Strength



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SPECIAL.

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is admirable
For Fire
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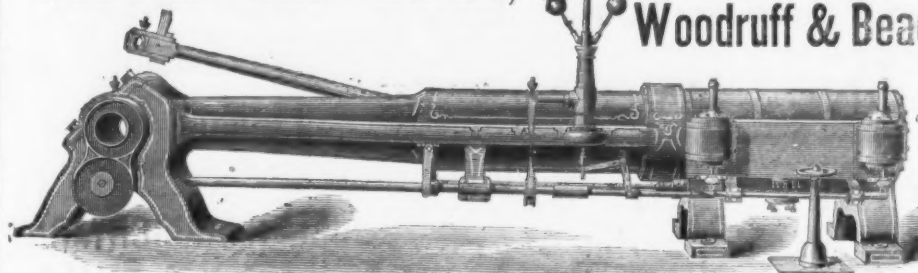
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With recent valuable improvements.



Steam Boilers

Constructed on hand and made to order any size or style. Special attention given to the manufacture of

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CASTINGS

Of any size or style. Direct all letters to The Woodruff Iron Works, Hartford, Conn., as the Woodruff & Beach Iron Works and firm of Woodruff & Beach are both dissolved.

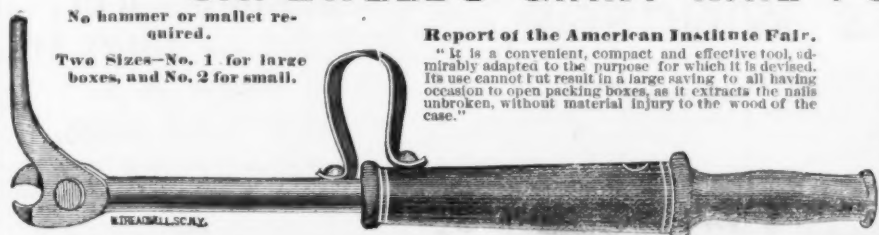
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No hammer or mallet required.

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The most Convenient, Effective and Cheapest NAIL EXTRACTOR

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Large Trade Supplied.

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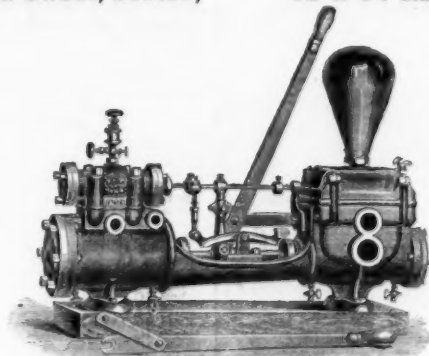
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Cut above represents regular Boiler Feed Pump, No. 2 and 4. Showing New Patent Valve Motion, and Hand Power LEVER Attached and Detached.

FIRE PUMPS, a specialty.

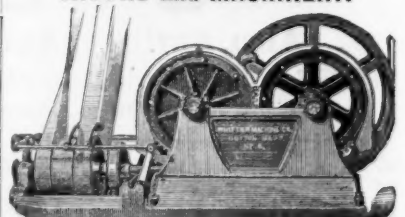
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Whittier Machine Co.,

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Manufacturers of

STEAM ENGINES, BOILERS, ELEVATORS and MACHINERY.



This Company has just received the highest award, a Gold Medal, for Safety Elevators, from the Massachusetts Charitable Mechanics Association.

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JAMES STURGIS
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Patented Steam and Hydraulic, April 1, 1868.



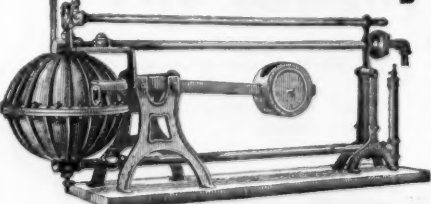
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Drawings made to order. Repairing of all kinds promptly attended to. Blacksmithing executed in all its branches.

The Albany Steam Trap.



This Trap automatically drains the water of condensation from Heating Coils, and returns the same to the Boiler whether the Coils are above or below the water level in Boiler, thus doing away with pumps and other mechanical devices for such purposes. Apply to

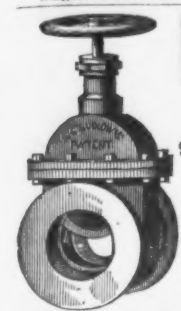
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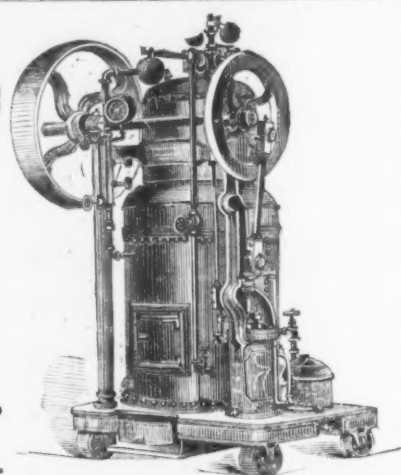
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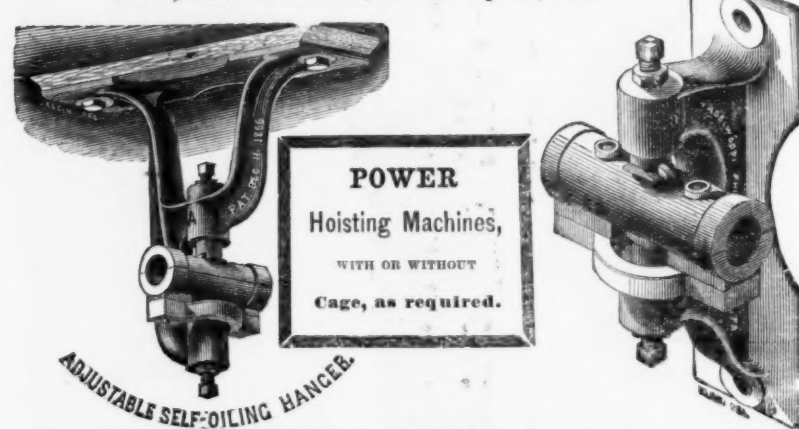
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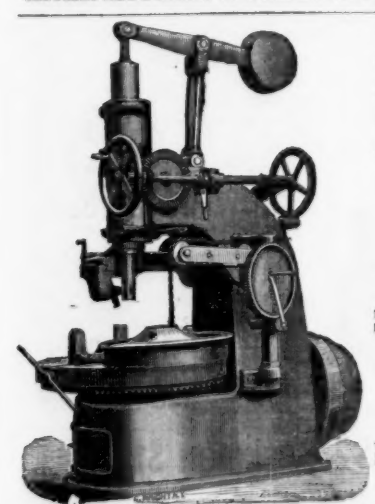
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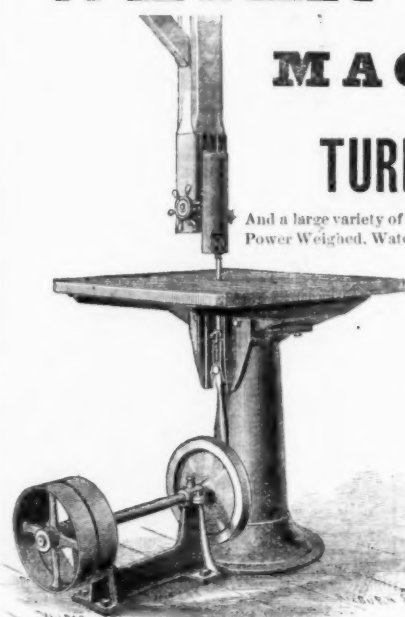
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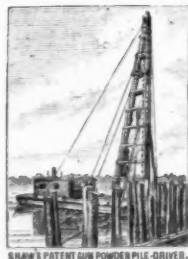
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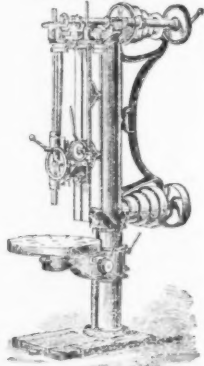
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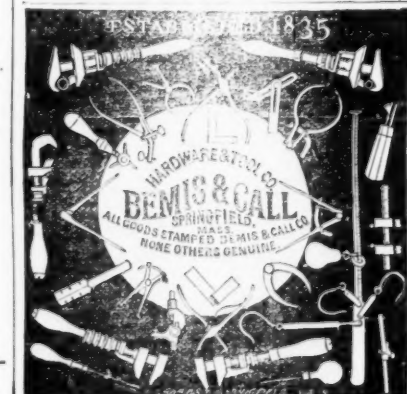
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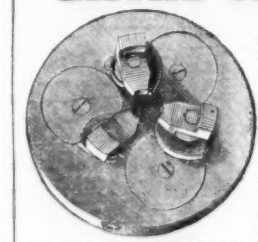
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New York, February 18, 1874

